THE

BALTIMORE

Medical and Philosophical Lycœum.

Vol. I. No. III.

FOR JULY, AUGUST AND SEPTEMBER.....1811.

*Researches on the Oxymuriatic Acid, its nature and combinations; and on the Elements of the Muriatic Acid. With some experiments on Sulphur and Phosphorus, made in the Laboratory of the Royal Institution.**

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From the London Philosophical Magazine.

THE illustrious discoverer of the oxymuriatic acid considered it as muriatic acid freed from hydrogen,* and the common muriatic acid as a compound of hydrogen and oxymuriatic acid; and on this theory he denominated oxymuriatic acid, dephlogisticated muriatic acid.

M. Berthollet,* a few years after the discovery of Scheele, made a number of important and curious experiments on this body; from which he concluded, that it was composed of muriatic acid gas and oxygen; and this idea for nearly twenty years has been almost universally adopted.

Dr. Henry, in an elaborate series of experiments, made with the view of decomposing muriatic acid gas, ascertained

* Mem. Acad. Stockholm for 1774, p. 94.
† Journal de Phisique, 1785, p. 325.

that hydrogen was produced from it by electricity; and he attributed the phænomenon to water contained in the gas.*

In the Bakerian lecture for 1808, I have given an account of the action of potassium upon muriatic acid gas, by which more than one-third of its volume of hydrogen is produced; and I have stated, that muriatic acid can in no instance be procured from oxymuriatic acid, or from dry muriates, unless water or its elements be present.

In the second volume of the *Memoires d'Arcueil*, M. M. Gay Lussac and Thenard have detailed an extensive series of facts upon muriatic acid and oxymuriatic acid. Some of their experiments are similar to those I have detailed in the paper just referred to; others are peculiarly their own, and of a very curious kind: their general conclusion is, that muriatic acid gas contains about one quarter of its weight of water; and that oxymuriatic acid is not decomposable by any substances but hydrogen, or such as can form triple combinations with it.

One of the most singular facts that I have observed on this subject, and which I have before referred to, is, that charcoal, even when ignited to whiteness in oxymuriatic or muriatic acid gases, by the Voltaic battery, effects no change in them, if it has been previously freed from hydrogen and moisture by intense ignition in vacuo.

This experiment, which I have several times repeated, led me to doubt of the existence of oxygen in that substance, which has been supposed to contain it above all others in a loose and active state; and to make a more rigorous investigation than had been hitherto attempted for its detection.

If oxymuriatic acid gas be introduced into a vessel exhausted of air, containing tin; and the tin be gently heated, and the gas in sufficient quantity, the tin and the gas disappear, and a limpid fluid precisely the same as Libavius's liquor, is formed: it occurred to me, that if this substance is a combination of muriatic acid and oxyde of tin, oxyde of tin ought

* Philosophical Transactions for 1800, p. 191.

to be separated from it by means of ammonia. I admitted ammonical gas over mercury to a small quantity of the liquor of Libavius; it was absorbed with great heat, and no gas was generated; a solid result was obtained, which was of a dull white color; some of it was heated, to ascertain if it contained oxyde of tin; but the whole volatalized, producing dense pungent fumes.

Another experiment of the same kind, made with great care, and in which the ammonia was used in great excess, proved that the liquid of Libavius cannot be decompounded by ammonia; but that it forms a new combination with this substance.

I have described, on a former occasion, the nature of the operation of phosphorus on oxymuriatic acid; and I have stated that two compounds, one fluid and the other solid, are formed in the process of combustion, of which the first, on the generally received theory of the nature of oxymuriatic acid, must be considered as a compound of muriatic acid and phosphorus acid. It occurred to me, that if the acids of phosphorous really existed in these combinations, it would not be difficult to obtain them, and thus to gain proofs of the existence of oxygen in oxymuriatic acid.

I made a considerable quantity of the solid compound of oxymuriatic acid and phosphorus by combustion, and saturated it with ammonia, by heating it in a proper receiver filled with ammoniacal gas, on which it acted with great energy, producing much heat; and they formed a white opake powder. Supposing that this substance was composed of the dry muriates and phosphates of ammonia; as muriate of ammonia is very volatile, and as ammonia is driven off from phosphoric acid, by a heat below redness, I conceived that, by igniting the product obtained, I should procure phosphoric acid; I therefore introduced some of the powder into a tube of green glass, and heated it to redness, out of the contact of air, by a spirit lamp; but found to my great surprise, that it was not at all volatile nor decomposable at this degree of heat, and that it gave off no gaseous matter.

The circumstance, that a substance composed principally of oxymuriatic acid and ammonia should resist decomposition or change at so high a temperature, induced me to pay particular attention to the properties of this new body.

It had no taste nor smell; it did not seem to be soluble, nor did it undergo any perceptible change when digested in boiling water: it did not appear to be acted upon by sulphuric, muriatic, or nitric acids, nor by a strong lixivium of potash. The only processes by which it seemed susceptible of decomposition were by combustion, or the action of ignited hydrat of potash. When brought into the flame of a spirit lamp and made red-hot, it gave feeble indications of inflammation, and tinged the flame of a yellow color, and left a fixed acid having the properties of phosphoric acid. When acted on by red-hot hydrat of potash, it emitted a smell of ammonia, burnt where it was in contact with air, and appeared to dissolve in the alkali. The potash which had been so acted upon gave muriatic acid, by the addition of sulphuric acid.

I heated some of the powder to whiteness, in a tube of platina; but it did not appear to alter; and after ignition gave ammonia by the action of fused hydrat of potash.

I caused ammonia, made as dry as possible, to act on the phosphuretted liquor of M. M. Gay Lussac and Thenard; and on the sulphuretted muriatic liquor of Dr. Thomson; but no decomposition took place; nor was any muriate of ammonia formed when proper precautions were taken to exclude moisture. The results were new combinations; that from the phosphuretted liquor was a white solid, from which a part of the phosphorus was separated by heat; but which seemed no further decomposable, even by ignition. That from the sulphuretted liquor was likewise solid, and had various shades of color, from a bright purple to a golden yellow, according as it was more or less saturated with ammonia; but as these compounds did not present the same uniform and interesting properties as that from the phosphoric sublimate, I did not examine them minutely: I contented

myself by ascertaining that no substance known to contain oxygen could be procured from oxymuriatic acid, in this mode of operation.

It has been said, and taken for granted by many chemists, that when oxymuriatic acid and ammonia act upon each other, water is formed; I have several times made the experiment, and I am convinced that this is not the case. When about 15 or 16 parts of oxymuriatic acid gas are mixed with from 40 to 45 parts of ammoniacal gas, there is a condensation of nearly the whole of the acid and alkaline gases, and from five to six parts of nitrogen are produced; and the result is dry muriate of ammonia.

Mr. Cruikshank has shown that oxymuriatic acid and hydrogen, when mixed in proportions nearly equal, produce a matter almost entirely condensible by water; and M. M. Gay Lussac and Thenard have stated that this matter is common muriatic acid gas, and that no water is deposited in the operation. I have made a number of experiments on the action of oxymuriatic acid gas and hydrogen. When these bodies were mixed in equal volumes over water, and introduced into an exhausted vessel and fired by the electric spark, there was always a deposition of a slight vapour, and a condensation of from $\frac{1}{10}$ to $\frac{1}{20}$ of the volume; but the gas remaining was muriatic acid gas. I have attempted to make the experiment in a manner still more refined, by drying the oxymuriatic acid and the hydrogen by introducing them into vessels containing muriate of lime, and by suffering them to combine at common temperatures; but I have never been able to avoid a slight condensation; though, in proportion as the gases were free from oxygen or water, this condensation diminished.

I mixed together sulphuretted hydrogen in a high degree of purity and oxymuriatic acid gas, both dried, in equal volumes: in this instance the condensation was not $\frac{1}{40}$; sulphur, which seemed to contain a little oxymuriatic acid, was formed on the sides of the vessel; no vapour was deposited; and

the residual gas contained about $\frac{12}{20}$ of muriatic acid gas, and the remainder was inflammable.

M. M. Gay Lussac and Thenard have proved by a copious collection of instances, that in the usual cases where oxygen is procured from oxymuriatic acid, water is always present, and muriatic acid gas is formed: now, as it is shown that oxymuriatic acid gas is converted into muriatic acid gas by combining with hydrogen, it is scarcely possible to avoid the conclusion, that the oxygen is derived from the decomposition of water, and, consequently, that the idea of the existence of water in muriatic acid gas is hypothetical, depending upon an assumption which has not yet been proved—the existence of oxygen in oxymuriatic acid gas.

M. M. Gay Lussac and Thenard indeed have stated an experiment, which they consider as proving that muriatic acid gas contains one quarter of its weight of combined water. They passed this gas over litharge, and obtained so much water; but it is obvious that in this case they formed the same compound as that produced by the action of oxymuriatic acid on lead; and in this process the muriatic acid must lose its hydrogen, and the lead its oxygen; which of course would form water: these able chemists, indeed, from the conclusion of their memoir, seem aware that such an explanation may be given, for they say that the oxymuriatic acid *may be* considered as a simple body.

I have repeated those experiments which led me first to suspect the existence of combined water in muriatic acid, with considerable care; I find that, when mercury is made to act upon 1 in a volume of muriatic acid gas, by Voltaic electricity, all the acid disappears, calomel is formed, and about ·5 of hydrogen evolved.

With potassium, in experiments made over very dry mercury, the quantity of hydrogen is always from nine to eleven, the volume of the muriatic acid gas used being 20.

And in some experiments made very carefully by my brother Mr. John Davy, on the decomposition of muriatic acid gas, by heated tin and zinc, hydrogen equal to about half its

volume was disengaged, and metallic muriates, the same as those produced by the combustion of tin and zinc in oxymuriatic gas, resulted.

It is evident from this series of observations, that Scheele's view (though obscured by terms derived from a vague and unfounded general theory) of the nature of the oxymuriatic and muriatic acids may be considered as an expression of facts; whilst the view adopted by the French school of chemistry, and which, till it is minutely examined, appears so beautiful and satisfactory, rests, in the present state of our knowledge, upon hypothetical grounds.

When oxymuriatic acid is acted upon by nearly an equal volume of hydrogen, a combination takes place between them, and muriatic acid gas results. When muriatic acid gas is acted on by mercury, or any other metal, the oxymuriatic acid is attracted from the hydrogen, by the stronger affinity of the metal; and an oxymuriate, exactly similar to that formed by combustion, is produced.

The action of water upon those compounds, which have been usually considered as muriates, or as dry muriates, but which are properly combinations of oxymuriatic acid with inflammable bases, may be easily explained, according to these views of the subject. When water is added in certain quantities to Libavius's liquor, a solid crystalized mass is obtained, from which oxide of tin and muriate of ammonia can be procured by ammonia. In this case, oxygen may be conceived to be supplied to the tin, and hydrogen to the oxymuriatic acid.

The compound formed by burning phosphorus in oxymuriatic acid is in a similar relation to water: if that substance be added to it, it is resolved into two powerful acids; oxygen, it may be supposed, is furnished to the phosphorus to form phosphoric acid, hydrogen to the oxymuriatic acid to form common muriatic acid gas.

None of the combinations of the oxymuriatic acid with inflammable bodies can be decomposed by dry acids; and this seems to be the test which distinguishes the oxymuriatic

combinations from the muriates, though they have hitherto been confounded together. Muriate of potash for instance, if M. Berthollet's estimation of its composition approaches towards accuracy, when ignited, is a compound of oxymuriatic acid with pottassium: muriate of ammonia is a compound of muriatic acid gas and ammonia; and when acted on by potassium, is decompounded: the oxymuriatic acid may be conceived to combine with the potassium to form muriate of potash, and the ammonia and hydrogen are set free.

The vivid combustion of bodies in oxymuriatic acid gas, at first view, appears a reason why oxygen should be admitted in it; but heat and light are merely results of the intense agency of combination. Sulphur and metals, alkaline earths and acids, become ignited during their mutual agency; and such an effect might be expected in an operation so rapid, as that of oxymuriatic acid upon metals and inflammable bodies.

It may be said, that a strong argument in favour of the hypothesis, that oxymuriatic acid consists of an acid basis united to oxygen, exists in the general analogy of the compounds of oxymuriatic acid, and metals, to the common neutral salts: but this analogy, when strictly investigated, will be found to be very indistinct; and even allowing it, it may be applied with as much force to support an opposite doctrine, namely, that the neutral salts are compounds of bases with water, and the metals of bases with hydrogen; and that, in the case of the action of oxymuriatic acid and metals, metal furnishes hydrogen to form muriatic acid, and a basis to produce the neutral combination.

That the quantity of hydrogen evolved during the decomposition of muriatic acid gas by metals, is the same that would be produced during the decomposition of water by the same bodies, appears, at first view, an evidence in favour of the existence of water in muriatic acid gas; but as there is only one known combination of hydrogen with oxymuriatic acid, one quantity must always be separated. Hydrogen is disengaged from its oxymuriatic combination,

by a metal, in the same manner as one metal is disengaged by another from similar combinations, and of all inflammable bodies that form compounds of this kind, except perhaps phosphorus and sulphur, hydrogen is that which seems to adhere to oxymuriatic acid with the least force.

I have caused strong explosions from an electrical jar to pass through oxymuriatic gas, by means of points of platina, for several hours in succession; but it seemed not to undergo the slightest change.

I electrized the oxymuriates of phosphorus and sulphur for some hours, by the power of the Voltaic apparatus of 1000 double plates: no gas separated, but a minute quantity of hydrogen, which I am inclined to attribute to the presence of moisture in the apparatus employed; for I once obtained hydrogen from Libavius's liquor by a similar operation; but I have ascertained that this was owing to the decomposition of water adhering to the mercury; and in some late experiments made with 2000 double plates, in which the discharge was from platina wires, and in which the mercury used for confining the liquor was carefully boiled, there was no production of any permanent elastic matter.

As there are no experimental evidences of the existence of oxygen in oxymuriatic acid gas, a natural question arises concerning the nature of these compounds, in which the muriatic acid has been supposed to exist, combined with much more oxygen than oxymuriatic acid, in the state in which it has been named, by Mr. Chenevix, hyperoxygenized muriatic acid.

Can the oxymuriatic *acid* combine either with oxygen or hydrogen, and form with each of them an acid compound; of which that with hydrogen has the strongest, and that with oxygen the weakest affinity for bases? for the able chemist to whom I have just referred, conceives that hyperoxymuriates are decomposed by muriatic acid. Or, is hyperoxymuriatic acid, the basis of all this class of bodies, the most simple form of this species of matter?

The phenomena of the composition and docomposition of the hyperoxymuriates may be explained on either of these suppositions; but they are mere suppositions unsupported by experiment.

I have endeavoured to obtain the neutralizing acid, which has been imagined to be hyperoxygenized, from hyperoxymuriate of potash by various modes, but uniformly without success. By distilling the salt with dry boracic acid, though a litle oxymuriatic acid is generated, yet oxygen is the chief gaseous product, and a muriate of potash not decomposable is produced.

The distillation of the orange-coloured fluid, produced by dissolving hyperoxymuriate of potash in sulphuric acid, affords only oxygen in great excess, and oxymuriatic acid.

When solutions of muriates or muriatic acid are electrized in the Voltaic circuit, oxymuriatic acid is evolved at the positive surface, and hydrogen at the negative surface. When a solution of oxymuriatic acid in water is electrized oxymuriatic acid and oxygen appear* at the positive surface, and hydrogen at the negative surface; facts which are certainly unfavourable to the idea of the existence of hyperoxygenized muriatic acid, whether it be imagined a compound of oxymuriatic acid with oxygen, or the basis of oxymuriatic acid.

If the facts respecting the hyperoxymuriate of potash, indeed be closely reasoned upon, it must be regarded as nothing more than as a triple compound of oxymuriatic acid, potassium and oxygen. We have no right to assume the existence of any peculiar acid in it, or of a considerable portion of combined water; and it is perhaps more conformable to the analogy of chemistry, to suppose the large quantity of oxygen combined with the potassium, which we know has

* The quantity of oxymuriatic acid in the aqueous solution is so small that the principal products must be referred to the decomposition of water. This happens in other instances; the water only is decomposed in dilute solutions of nitric and sulphuric acids.

an intense affinity for oxygen, and which, from some experiments, I am inclined to believe, is capable of combining directly with more oxygen than exists in potash, than with the oxymuriatic acid, which as far as is known, has no affinity for that substance.

It is generally supposed that a mixture of oxymuriatic acid and hyperoxymuriatic acid is disengaged when hyperoxymuriate of potash is decomposed by common muriatic acid* but I am satisfied from several trials, that the gas produced in this way, when not mixed with oxygen, unites to the same quantity of hydrogen,† as common oxymuriatic acid gas from manganese; and I find, by a careful examination, that the gas disengaged during the solution of platina, in a mixture of nitric and muriatic acids, which has been regarded as hyperoxymuriatic acid, but which I stated some years ago to possess the properties of oxymuriatic gas,‡ is actually that body owing its peculiar colour to a small quantity of nitromuriatic vapor suspended in it, and from which it is easily freed by washing.

* If hyperoxymuriate of potash be decomposed by nitric or sulphuric acid, it affords oxymuriatic acid and oxygen. If it be acted upon by muriatic acid, it affords a large quantity of oxymuriatic acid gas only. In this last case, the phenomenon seems merely to depend upon the decomposition of the muriatic acid gas, by the oxygen loosely combined in the salt.

† This likewise appears from Mr. Cruikshank's experiments. See Nicholson's Journal, vol. v. 4to, p. 206.

‡ The platina, I find by several experiments made with great care, has no share in producing the evolution of this gas. It is formed during the production of aqua regia. The hydrogen of the muriatic acid attracts oxygen from the nitric acid. Oxymuriatic acid gas is set free, and nitrous gas remains in the solution, and gives it a deep red colour. *Nitrous* acid and muriatic acid produce no oxymuriatic acid gas. Platina, during its solution is perfectly formed aqua regia, gives only nitrous gas and nitrous vapor; and I find, that rather more oxymuriatic acid gas is produced, by heating together equal quantities of nitric acid of 1·45, and muriatic acid 1·18, when they are not in contact with platina, than when exposed to that metal. The oxymuriatic acid gas produced from muriatic acid, by nitric acid, I find combines with about an equal volume of hydrogen by detonation.

Few substances, perhaps, have less claim to be considered as acid, than oxymuriatic acid. As yet we have no right to say that it has been decompounded; and as its tendency of combination is with pure inflammable matters, it may possibly belong to the same class of bodies as oxygen.

May it not in fact be a *peculiar* acidifying and dissolving principle, forming compounds with combustible bodies, analogous to acids containing oxygen or oxides, in their properties and powers of combination; but differing from them, in being for the most part decomposable by water. On this idea muriatic acid may be considered as having hydrogen for its basis, and oxymuriatic acid for its acidifying principle. And the phosphoric sublimate as having phosphorus for its basis, and oxymuriatic acid for its acidifying matter. And Libavius's liquor, and the compounds of arsenic with oxymuriatic acid, may be regarded as analogous bodies, The combinations of oxymuriatic acid with lead, silver, mercury, potassium and sodium, in this view would be considered as a class of bodies related more to oxides than acids, in their powers of attraction.

It is needless to take up the time of this learned society by dwelling upon the imperfection of the modern nomenclature of these substances. It is in many cases connected with false ideas of their nature and composition; and in a more advanced state of the inquiry, it will be necessary for the progress of science, that it should undergo material alterations.

It is extremely probable that there are many combinations of the oxymuriatic acid with inflammable bodies which have not been yet investigated. With phosphorus it seems capable of combining in at least three proportions; the phosphuretted muriatic acid of Gay Lussac and Thenard is the compound containing the maximum of phosphorus. The crystalline phosphoric sublimate, and the liquor formed by the combustion of phosphorus in oxymuriatic acid gas, disengage no phosphorus by the action of water; the sublimate, as I have already mentioned, affords phosphoric and muriatic

acid: and the liquid I believe only phosphorous acid and muriatic acid.

The sublimate from the boracic basis gives, I believe, only boracic and muriatic acid, and may be regarded as boracium acidified by oxymuriatic acid.

It is evident, that whenever an oxymuriatic combination is decomposed by water, the oxide or acid or alkali or oxidated body formed must be in the same proportion as the muriatic acid gas, as the oxygen and hydrogen must bear the same relation to each other; and experiments upon these compounds will probably afford simple modes of ascertaining the proportions of the elements, in the different oxides, acids, and alkaline earths.

If, according to the ingenious idea of Mr. Dalton, hydrogen be considered as one in weight, in the proportion it exists in water, then oxygen will be nearly 7·5; and assuming that potash is composed of one proportion of oxygen, and one of potassium, then potash will be 48, and potassium* about 40·5; and from an experiment which I have detailed in the last Bakerian lecture, on the combustion of potassium in muriatic acid gas, oxymuriatic acid will be represented by 32·9, and muriatic acid gas of course by 33·9; and this estimation agrees with the specific gravity of oxymuriatic acid gas, and muriatic acid gas. From my experiments, 100 cubical inches of oxymuriatic acid gas weigh, the reductions being made for the mean temperature and pressure, 74·5 grains; whereas by estimation they should weigh 74·6. Muriatic acid gas I find weighs, under like circumstances, in the quantity of 100 cubic inches, 39 grains; by estimation it should weigh 38·4 grains.

It is easy from these data, knowing the composition of any dry muriate, to ascertain the quantity of oxide or of acid it would furnish by the action of water, and consequently the quantity of oxygen with which the inflammable matter will combine.†

* Supposing potash to contain nearly 15·6 per cent of oxygen.

† I have stated in the last Bakerian lecture, that during the decomposition of the amalgam from ammonia, one in volume of

In considering the dry muriates, as compounds of oxymuriatic acid and inflammable bodies; the argument that I have used in the last Bakerian lecture, to show that potassium does not form hydrate of potash by combustion, is considerably strengthened; for from the quantity of oxymuriatic acid the metal requires to produce a muriate, it seems to be shown that it is the simplest known form of the alkaline matter. This I think approaches to an experimentum crucis. Potash made by alcohol, and that has been heated to redness, appears to be a hydrate of potash, whilst the potash formed by the combustion of potassium must be considered as a pure metallic oxide, which requires about 19 per cent. of water to convert into a hydrate.

Amongst all the known combustible bodies, charcoal is the only one which does not combine directly with oxymuriatic acid gas, and yet there is reason for believing that this com-

hydrogen to two of ammonia is evolved: it is remarkable that whatever theory of the nature of this extraordinary compound be adopted there will be a happy coincidence as to definite proportions. If it be supposed that the hydrogen arises from the decomposition of water; then the oxygen that must be assumed to exist in ammonia, will be exactly sufficient to neutralize the hydrogen, in an equal volume of muriatic acid; or if it be said that ammonium is a compound of two of ammonia and one of hydrogen in volume, then equal volumes of muriatic gas and ammonia will produce the same compound as oxymuriatic acid and ammonium, supposing they could be immediately combined. I once thought that the phenomena of metallization might be explained according to the modified phlogistic theory, by supposing three different classes of metallic bodies: First, the metal of ammonia, in which hydrogen was so loosely combined as to be separable with great ease, and which, in consequence of the small affinity of the basis for water, it had little tendency to combine with oxygen. The second, the metals of the alkalies and alkaline earths, in which the hydrogen was more firmly combined, but in combustion, forming water capable of being separated from the basis. And, thirdly the metals of the earths and common metals, in which the hydrogen was more intimately combined; producing by union with oxygen, water not separable by any new attractions. The phenomena of the action of potassium and sodium upon muriatic acid, referred to in the text, seem however to overturn these speculations so far as they concern the metals from the fixed alkalies.

bination may be formed by the intermedium of hydrogen. I am inclined to consider the only substance produced by the action of oxymuriatic acid gas, and olefiant gas, as a ternary compound of these bodies; for they combine nearly in equal volumes; and I find that by the action of potassium upon the oil so produced, muriate of potash is formed, and gaseous matter, which I have not yet been able to collect in sufficient quantity to decide upon its nature, is formed. Artificial camphor, and muriatic ether, as is probable from the ingenious experiments of M. Gehlen and M. Thenard, must be combinations of a similar kind, one probably with more hydrogen, and the other with more carbon.

One of the greatest problems in economical chemistry, is the decomposition of the muriates of soda and potash. The solution of this problem will, perhaps, be facilitated by these new views. The affinity of potassium and sodium for oxymuriatic acid is very strong; but so likewise is their attraction for oxygen, and the affinity of their oxides for water. The affinities of oxymuriatic acid gas for hydrogen, and of muriatic acid gas for water, are likewise of a powerful kind. Water, therefore, should be present in all cases, when it is intended to attempt to produce alkali. It is not difficult after these views to explain the decomposition of common salt, by aluminous or silicious substances, which, as it has been long known, act only when they contain water. In these cases the sodium may be conceived to combine with the oxygen of the water and with the earth, to form a vitreous compound; and the oxymuriatic acid to unite with the hydrogen of the water, forming muriatic acid gas.

It is also easy, according to these new ideas, to explain the decomposition of salt by moistened litharge, the theory of which has so much perplexed the most acute chemists. It may be conceived to be an instance of compound affinity: the oxymuriatic acid is attracted by the lead, and the sodium combines with the oxygen of the litharge and with water to form hydrate of soda, which gradually attracts carbonic acid from the air.

As iron has a strong affinity for oxymuriatic acid, I attempted to procure soda by passing steam over a mixture of iron filings, and muriate of soda intensely heated; and in this way I succeeded in decomposing some of the salt; hydrogen came over: a little hydrate of soda was formed, and muriate of iron was produced.

It does not seem improbable, supposing the views that have been developed accurate, that by complex affinities, even potassium and sodium in their metallic forms may be produced from their oxymuriatic combinations; for this purpose the oxymuriatic acid should be attracted by one substance, and the alkaline metals by another; and such bodies should be selected for the experiment, as would produce compounds differing considerably in degree of volatility.

I cannot conclude the subject of the application of these doctrines, without asking permission to direct the attention of the society to some of the theorectical relations of the facts noticed in the preceding pages.

That a body principally composed of oxymuriatic acid and ammonia, two substances which have been generally conceived incapable of existing together, should be so difficult of decomposition, as to be scarcely affected by any of the agents of chemistry, is a phenomenon of a perfectly new kind. Three bodies, two of which are permanent gases, and the other of which is considerably volatile, form in this instance a substance neither fusible nor volatile, at a white heat. It could not have been expected that ammonia would remain fixed at such a temperature; but that it should remain fixed in combination with oxymuriatic acid, would have appeared incredible, according to all the existing analogies of chemistry. The experiments on which these conclusions are founded, are, however, uniform in their results: and it is easy to repeat them. They seem to show, that the common chemical proposition, that complexity of composition is uniformly connected with facility of decomposition, is not well founded. The compound of oxymuriatic acid,

phosphorus and ammonia, resembles an oxide, such as silex, or that of columbium in its general chemical characters, and is as refractory when treated by common reagents; and except by the effects of combustion, or the agency of fused potash, its nature could not be detected by any of the usual methods of analysis. Is it not likely, reasoning from these circumstances, that many of the substances, now supposed to be elementary, may be reduced into simpler forms of matter? And that an intense attraction, and an equilibrium of attraction, may give to a compound, containing several constituents, that refractory character, which is generally attributed to unity of constitution, or to the homogeneous nature of its parts?

Besides the compound of the phosphoric sublimate and ammonia, and the other analogous compounds which have been referred to, it is probable that other compounds of like nature may be formed of the oxides, alkalies, and earths, with the oxymuriatic combinations, or of the oxymuriatic compounds with each other; and should this be the case, the more refined analogies of chemical philosophy will be extended by these new, and, as it would seem at first view, contradictory facts. For, if, as I have said, oxymuriatic acid gas be referred to the same class of bodies as oxygen gas, then, as oxygen is not an acid, but forms acids by combining with certain inflammable bodies, so oxymariatic acid, by uniting to similar substances, may be conceived to form either acids, which is the case when it combines with hydrogen, or compounds like acids or oxides, capable of forming neutral combinations, as in the instances of the oxymuriates of phosphorus and tin.

Like oxygen, oxymuriatic acid is attracted by the positive surface in Voltaic combinations, and on the hypothesis of the connexion of chemical attraction with electrical powers, all its energies of combination correspond with those of a body supposed to be negative in a high degree.

And in most of its compounds, except those containing the alkaline metals, which may be conceived in the highest

degree positive, and the metals with which it forms insoluble compounds, it seems still to retain its negative character.

I shall occupy the time of the society for a few minutes longer only, for the purpose of detailing a few observations connected with the Bakerian lectures, delivered in the two last years; particularly those parts of them relating to sulphur and phosphorus, which new and more minute inquiries have enabled me to correct or extend.

I have already mentioned that there are considerable differences in the results of experiments, made on the action of potassium, on sulphur and phosphorus, and their combinations with hydrogen according to different circumstances of the process. I shall now refer to such of these circumstances as I have been able fully to investigate.

The able researches of Dr. Thomson, have shown that sulphur, in its usual state, contains small quantities of acid matter; and though in my first experiments, I conceived that by employing crystallized native sulphur, which had been recently sublimed in nitrogen, I should avoid the presence of any foreign matter, yet I am inclined to believe that this is not the case; for by subliming some similar sulphur in nitrogen, I find that litmus paper placed in the upper part of the retort is slightly reddened.

When potassium is made to unite with sulphur, if the retort employed is not lined with sulphur, some of the potassium is destroyed by acting upon the glass; and when large quantities of sulphur are used, it is very difficult to decompose the whole of the sulphuret of potassium by an acid; sulphuretted hydrogen likewise is soluble in muriatic acid: and this circumstance led me to underrate the quantity of sulphuretted hydrogen given off in experiments of this kind.*

* This circumstance has been pointed out by M. M. Gay Lussac and Thenard, in a paper printed in the Journal de Physique for December, in which these gentlemen endeavour to show that,

In acting upon sulphuretted hydrogen by potassium in my early experiments, I used large quantities of the gas and of the metal; and in these cases I have reason to believe that the violence of the combustion occasioned the decomposition of a considerable quantity of the gas; and, in consequence, led me to form erroneous conclusions concerning the nature of this curious operation.

In all late experiments in which sulphur or sulphuretted hydrogen was concerned, I have used muriatic acid saturated with sulphuretted hydrogen over mercury. I have employed sulpur distilled from iron pyrites in vacuo, which did not in the slightest degree affect litmus paper, and I have combined it with potassium in retorts of green glass or plate glass lined with sulphur and filled with very pure nitrogen or hydrogen. In making potassium act upon sulphuretted hydrogen, I have employed the gas only in quantities of from one to three cubical inches, and have made the combination in narrow curved tubes of green glass over dry mercury. With all these precautions, and after having made a great number of experiments, I am not able to gain perfectly uniform results. Yet there is a sufficient correspondence between them to enable me to form conclusions, which I may venture to say cannot be far from the truth.

When one grain of potassium, which would give by the action of water about one cubical inch and $\frac{1}{16}$ of hydrogen is made to act upon about half a grain of sulphur, some sulphur sublimes during the combination, which always takes place with heat and light, and from $\frac{1}{14}$ to $\frac{1}{16}$ of a cubical inch of sulphuretted hydrogen is evolved. The compound acted on by muriatic acid, saturated with sulphuretted hydrogen, affords from $\frac{9}{10}$ to $\frac{11}{10}$ of a cubical inch of pure sulphuretted hydrogen.

whether potassium has been acted upon by large or small quantities of sulphur, and under all circumstances, it evolves a quantity of gas exactly equal to that which it produces by the action of water. I have been able to gain no results so precise on this subject. I have in another place (the same Journal in which their memoir has appeared) offered some observations on their inquiries.

When more sulphur is used so as to be from twice to ten times the weight of the potassium, the quantity of sulphuretted hydrogen evolved by the action of the acid, is from $\frac{7}{10}$ to $\frac{9}{10}$ but if heat be applied to the combination, so as to drive off the superfluous sulphur, the quantity of gas collected is very little inferior to that produced from the combination in which a small proportion of sulphur is used; and I am inclined to believe, from the phenomena presented in a great number of experiments, that sulphur and potassium, when heated together under common circumstances, combine only in one prportion, in which the metal is to the sulphur nearly as three to one in weight; and in which the quantities are such that the compound burns into neutral sulphate of potash.

When a grain of potassium is made to act upon about 1·1 cubical inches of sulphuretted hyrodgen, all the hydrogen is set free, and a sulpuret of potassium containing one fourth of sulphur is formed, exactly the same as that produced by the immediate combination of sulphur and the metal.

When sulphuretted hydrogen is employed in large quantities, there is an absorption of this gas, and a volume is taken up about equal to the quantity of hydrogen disengaged, and a compound of sulphuretted hydrogen and sulphuret of potash is formed, which gives sulphuretted hydrogen by the action of an acid, nearly double in quantity to that given by the sulphuret of potassium.

From a number of experiments I am inclined to believe that potassium and phophorous, in whatever quantities they are heated together combine only in one proportion, a grain of potassium requiring about one third of a grain of phosphorus to form a phosphuret; which when acted upon by muriatic acid, produces from $\frac{8}{10}$ to $\frac{10}{10}$ of a cubical inch of phosphuretted hydrogen.

Half a grain of potassium decomposes nearly three cubical inches of phosphuretted hydrogen, and sets free rather more than four cubical inches of hydrogen, and the phosphuret formed seems to be of the same kind as that produced by direct combination of the metal with phosphorus.

If, according to Mr. Dalton's ideas of proportion, the quantity in which sulphur enters into its combination were to be deduced from its union with potassium, in which it seems to form about one forth the weight of the compound, the number representing it would be 13·5. I have lately weighed sulphuretted hydrogen and sulphurous acid gas, with great care: the specific gravity of the first at mean temperature and pressure, from my experiments, is 10645, which differs very little from the estimation of Mr. Kirwan, that of sulphurous acid gas I find is 20967. Sulphuretted hydrogen, as I have shown, contains an equal volume of hydrogen; and on this datum the number representing sulphur is 13·4. I have never been able to burn sulphur in oxygen without forming sulphuric acid in small quantities; but in several experiments I have obtained from 92 to 98 parts of sulphurous acid from 100 of oxygen in volume; from which I am inclined to believe, that sulphurous acid consists of sulphur dissolved in an equal volume of oxygen; which would give the number as 13·7* nearly considering the acid gas as containing one proportion of sulphur, and two of oxygen; and these estimations do not differ from each other materially.

I have made several experiments on the combustion of phosphorus in oxygen gas. From the most accurate, I am inclined to conclude that 25 of phosphorus absorbed in com-

* The estimation from the composition of sulphuretted hydrogen, must be considered as most accurate, and that from the formation of the sulphuret of potassium as least accurate: for it was only by combining sulphur and potassium in small proportions, and ascertaining in what cases uncombined sulphur could be distilled from the compound, that I gained my conclusions concerning the composition of the sulphuret of potassium.

In the last Bakerian lecture, I have estimated the specific gravity of sulphuretted hybrogen at 35 grans the 100 cubical inches, which was not far from the mean between the estimations of Mr. Kirwan and Mr. Thenard. According to this last experiment, sulphuretted hydrogen is composed of one portion of hydrogen, represented by 1, and one of sulphur represented by 13·4.

bustion about 34 of oxygen in weight: and considering phosphoric acid as compound of three portions of oxygen and one of phosphorus, the number representing phosphorus, will be about 16·5, which is not very remote from the number that may be deduced from the composition of phosphuret of potassium.

The numbers which represent the proportions in which sulphur and phosphorus unite with other bodies, are such as do not exclude the existence of combined portions of oxygen and hydrogen in their constitution; but it may be questioned, whether the opinion which I formed, that the inflammable gas disengaged from them by electricity, is necessary to the peculiar form in which these bodies exist, is not erroneous. Phosphorus, as I have stated in the last Bakerian lecture is capable of forming a solid hydruret; and a part of the sulphur distilled from iron pyrites. is usually of a soft consistence, and emits the smell of sulphuretted hydrogen, and probably contains that body. It is not unlikely, that in all cases, phosphorus and sulphur contain small quantities of the hydrurets of phosphorus and sulphur; and the production of a minute portion of sulphuric acid in the slow combustion of sulphur, is probably connected with the production of water. Though the pure oxides of sulphur and phosphorus have never been obtained, yet from the doctrine of definite proportions, these bodies ought, under certain circumstances, to be formed. And I am inclined to believe that they sometimes exist in minute quantities in common phosphorus and sulphur, and with hydrogen give to them their variable properties.

The colours of different specimens of phosphorus, as well as of sulphur, differ considerably; the red colour of phosphorus as it is commonly prepared, is probably owing to a slight mixture of oxide. Common roll sulphur is of a very pale yellow, the Sicilian sulphur of an orange colour, and the sulphur distilled from iron pyrites in vacuo, which arose in the last period of the process, of a pale yellowish-green colour. All the late experiments that I have made, as well as my

former researches, induce me to suspect a notable proportion of oxygen in Sicilian sulphur, which may give rise to sulphuric acid in distillation, or to sulphuric acid itself.

Conceiving that, if definite proportions of oxgen and hydrogen exist in sulphur and phosphorus, they ought to be manifested in the agency of oxymuriatic acid gas on these bodies, I made some experiments on the results of these operations. In the first trial, on the combination of sulphur with oxymuriatic acid gas, I employed five grains of roll sulphur, and admitted the gas into the exhausted retort, from a vessel in which it had been in contact with warm water: in this case more than half a cubical inch of oxygen gas, and nearly two cubical inches of muriatic acid gas, were produced. Suspecting in this instance, that aqueous vapor had been decomposed, I employed cold water in the next experiment, and dried the gas by muriate of lime: in this case, though Sicilian sulphur was used, no oxygen gas was evolved; and not half a cubical inch of muriatic acid: the quantity was the same as in the last experiment; and it was found, that between 16 and 17 cubical inches of oxymuriatic acid gas disappearde; the whole of the sulphur was sublimed in the gas, and the liquor formed was of a tawny orange colour.

No oxygen was expelled during the combustion of phosphorus in oxymuriatic acid gas, nor could I ascertain that any muriatic acid had been formed; three grains of phosphorus were entirely converted into sublimate, by the absorption of about 23 cubical inches and a half of the gas.

It would seem from these quantities, that the sulphuretted liquor formed by subliming sulphur in oxymuriatic acid gas, consists of one proportion of sulphur, represented by 13·5, and one of oxymuriatic gas, represented by 82·9, and that the phosphoric sublimate must be composed of three portions of oxymuriatic gas, represented by 98·7 and one of phosphorus respresented by 16·5

Harsnepe's Case of Canine Madness.

Reister's-Town, Baltimore County, May 27, 1811.

DEAR SIR,

Agreeably to your request, I herewith transmit the statement of a case of hydrophobia, which was treated successfully.

Negro Matilda, aged eleven years, belonging to Mr. Nathaniel Watts, about seven miles from this village, was bit by a mad dog, on the evening of the seventh of April, 1810. As the part affected appeared to be only a slight scratch, it was not thought of sufficient importance to require medical assistance; the result however proved the reverse. On the eighth day* after she receivedthe injury, about ten o'clock in

* When the encounter with the dog took place, the girl was alone, and from home. In detailing the particulars soon after her return, she remarked "*that the dog was very weak*, because she easily beat him off with a stick, and he then scrambled over a fence with great difficulty." He was seen the next morning not quite a mile from the place where the girl left him, but never afterwards, although there was a diligent search for him by some of the neighbours. It was fair to conclude that he died very soon after the girl had been bit; otherwise he would have been discovered in a country so populous, and where so great an alarm had been excited.

The short space that elapsed from the time the virus was inflicted, till the symptoms of canine madness were apparent, seems to lead to a conclusion corroborated by many other facts, viz. that the virus of rabid animals is virulent in proportion to the continuance of their disease. Among many other arguments in support of this opinion, I state the following facts which came within my own knowledge, but were recorded by my father. "A dog belonging to a near neighbour, bit three cows, seven hogs and two dogs, before it was ascertained that he was mad. The whole twelve animals died mad; but the disease appeared at a period when it was not expected. The first case was one of the dogs, six months after he had been bit, but none of the others were affected till the ninth month, and before the end of the tenth, they were all mad. The dog that bit them, was discovered to be indisposed eight or ten hours before they were bit, and certainly

the morning she was sent to a spring for a bucket of water, which she carried to the house as usual, and returned for a second. The spring is about three feet in diameter at its surface, and when she came very near it she threw her bucket down, and ran precipitately into an adjoining wood. Mr. Watts' son observed her, saw her throw away the bucket, and repeatedly called to her to stop, but she paid no attention to his calls. He followed her, and as soon as she perceived that he was likely to overtake her, she turned towards him, apparently with an intention of seizing him. He retreated, she pursued, and he made his escape by geting a fence between them. As she ran through the wood she foamed copiously at the mouth, and the saliva ran down her jaws. She now proceeded in a brisk trot (which those who saw her compared to that of a dog) towards the house, and soon became more composed. By this time the family had assembled and collected some of the near neighbours, by whose united exertions she was driven into an out house. Before she went into the house one of Mr. Watts' sons approached her and she attempted to seize him.

The features of the disease were now so manifest, that it was evident death must soon be the consequence, unless medical aid could be speedily procured. A messenger was therefore immediately dispatched for me. Being a considerable distance from home, it was not in my power to reach her before eight o'clock in the evening.—I found her exceedingly depressed in both body and mind, speechless, and apparently senseless, sitting on some straw on the floor, with her body bent forwards, and her arms and legs closely contracted to it. Her eyes were fixed, the balls highly inflamed and greatly

no appearance of disease was discernible twenty four hours before. The same year (1785) a mad dog that had been harrassed for two or three weeks, bit a cow, three dogs, two horses and several hogs, on the farm of John Russel, all of which were seized with madness within two weeks, one of the dogs was attacked in five days, and one of the horses on the seventh. This dog exhausted by his pursuers and the disease, died the same nignt he did the mischief at Russell's house." [*Editor.*

protruded, the lids widely distended, which altogether gave her a wild maniacal yet melancholy appearance. Her pulse was natural, except that it was fuller than in health. Her extremities were stiff, and great force was required to extend them; they might aptly have been compared to a piece of lead that had been bent, for they remained in whatsoever position they were put, notwithstanding great force was required to bend them. Upon examining the bitten part I found it somewhat swollen and considerably inflamed; but no discharge was to be discovered, nor had there been any before.

I drew twelve ounces of blood from the arm, and immediately prepared the following bolus.

R. G. Camphor, Grs. xviij.
Tr. Opi. Gttæ: xviij.
Calomel Grs. iv.
Cons: Ros: Q. S. Fiat: Bol: 1.

The medicine was mixed with a little tea, and on attempting to pour it down her throat (the action of the muscles opposing) a large quantity of saliva was dischaged of a consistence so tenacious that it had an appearance almost membranous. By these efforts a great part of the medicine was lost. After three attempts to give her a bolus, I do not think she swallowed more than the contents of one. She swallowed all fluids with great difficulty; but she was little distressed in swallowing solids.

An epispastic was now applied over the bitten part, and I ordered a quantity (how much I do not now recollect) of the Ung: Mercur: Fort: to be rubbed on her thighs, and under her throat. About forty minutes after she had taken the bolus, the rigidity of her limbs relaxed, and it would appear that the organs of speech partook of the same effects, for she spoke and gave intelligent answers. I asked her how she was? She answered, very well. I asked her whether she felt pain? She replied, not then, but that she had felt a violent pain in her arm, in the morning. I enquired of her in which arm she had felt the pain? In this

she said, putting her other hand on the bitten part. I requested her to inform me how it had effected her? It ran, said she, from this place, (putting her hand again on the part bitten) up my arm and all over my body. I remained at the house all night, and repeated the bolus eight hours after she had taken the first. It was with great difficulty I could get it down, for the reasons already assigned. She again discharged a large portion of the same sort of tough viscid saliva. She sat up a great part of the night, though she sometimes laid down, and occasionally got a little sleep. Several times during the night, she threw out of her mouth considerable quantities of tough, mucilaginous saliva, seemingly by the joint action of the muscles of deglutition, and a partial effort of the stomach to evacuate itself. The next morning I gave her another bolus, which she swallowed with great difficulty, and discharged saliva in quantity and quality as before. I found that the best mode of administering the bolus was to give some warm drink previously, to produce a discharge of the saliva, and to follow it immediately by the medicine.—At this time, I noticed the pulse particularly, and found it very variable. At one time it was very weak and low, and in ten or fifteen minutes, it would become perfectly natural: in the same time again it would become very full, approaching to hardness. This variable state of the pulse continued several days. As the patient was now sensible, I gave her a small portion of calomel and desired her to rub it on her gums and internal fauces, which she did according to my directions. This practice was pursued morning and evening till the mouth was affected. I did not direct the use of the calomel in this way, with a view of salivating, but under the impression that it would act as a specific against the virus. The calomel did not produce purgative effects, for the intestinal canal was unsually torpid; so much so, that injections frequently became necessary, and appeared to be useful.—The secretions did not appear to be materially altered, except that of the saliva—the urine was no way changed as to quantity or quality.—The perspiration

was a little increased on the two or three first days of the disease, the skin being soft during that period. The tongue exhibited a natural appearance, except a small red streak in the middle through its whole length, which was of a scarlet red, and perfectly dry. This appearance vanished at the commencement of the ptyalysm, for after that took place, the case became altogether a mercurial disease, and was managed as such.

I left my patient at ten o'clock in the morning, (second day of the disease) and returned in the evening, when I was informed that she was worse. She had been talking incoherently, grated her teeth frequently, and snapped them together with great violence. She expressed a desire to see the dog, and declared that she would bite him. A vast concourse of people assembled to see a sight so novel and interesting. She took but little notice of them, except one lady. During the violent spasmodic struggles with which she was tormented, she insisted that this woman was the dog, and used every possible exertion to bite her. The lady wore a black gown, and it was remarkable that the dog was black. She seemed to have associated the idea of the person and the dog by colour alone. The boluses were continued every eight hours, till Tuesday, the seventeenth; she then took half the quantity every four hours, till Thursday the nineteenth, when observing a ptyalysm to have commenced, the medicine was administered less frequently, once, twice or thrice in twenty-four hours, and sometimes in forty-eight hours. During the internal use of the medicine, the mercurial friction had been used as already directed, each night and morning, but was now applied less fqrequently, and more sparingly. Although the ptyalysm was well established in six or seven days from the first prescription, I increased the action of the mercury gradually, and lest the untoward symptoms, of so horrible a malody should recur, it was kept up six weeks. The blistered parts was kept open by epispastic ointment. In the height of the salivation, an accidental exposure to cold and dampness augmented the effects of

the mercury exceedingly, and she now became very ill of the mercurial disease. These appearances, more formidable in appearance than reality, soon began to subside, and she finally recovered. I have seen my old patient repeatedly since, and she enjoys perfect health. Perhaps I ought to have noticed more particularly, that the discharge of viscid saliva on swallowing liquids, the difficuly of swallowing fluids, together with the variable state of the pulse, vanished at the first dawn of the salivation.

These are the principal facts that occurred in the above case, and are offered to you for such use as you may think proper to make of them, by

Your obedient Servant,

WILLIAM HARSNEPE.

Nathaniel Potter, M. D.

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WILLIAMSON

On the connection between Scrofula and Phthysis Pulmonalis.

(Continued.)

WHEN the scrofula of the lungs terminates in a complete phthysis, I believe this species of consumption much more difficult to cure than that from pneumonia.*

That the phthysis pulmonalis of whatever nature, is in a great majority of cases fatal, is a truth proved by innumerable facts. That this should be the case, is by no means won-

* "Now although a vomica of the lungs is never without danger, yet experience teaches, that many more persons recover, when, after a suppuration in consequence of a pleurisy or a peripneumonia, they spit a large quantity of pus at once, than when the pus is collected in small tubercles in the lungs." Doctor Mead affirms the same. "This disease, although it be dangerous and often ends in consumption, yet is not so dangerous as those smaller ulcers."

Vanswieten Comment.

derfuſ, for, it cannot be cured unless the ulcers in the lungs can be healed; and every body knows that it is almost impossible to heal ulcers in the lungs. The reason of this difficulty is thus accounted for by Galen—" Neque enim citra tussim expurgari possunt, illisque tussientibus laceratur locus. Itaque quasi per mutuas operas malum illis inorbem redit; quar namque lacerata sunt, rursus phlegmonem excitant; secundo iterum oportet maturari phlegmonem, et pus expurgari.* These objections will hold good in ulcers of the lungs from any cause. Ulcers of scrofulous tumours are difficult to cure when seated on the exterior of the body, they are no doubt much more so when they have their seat in the lungs.

What Celsus said of the peripneumonia, may with much propriety be said of the phthysis pulmonalis, especially that of a scrofulous nature. " Id genus morbi plus periculi quamdoloris habet."

When the patient is much emaciated, it may be necessary to have access to other strengthening medicines than the muriat of barytes and lime. In this case some of the bitters may be found more salutary than any other medicines with which we are acquainted. Among the bitters I think the bark preferable, in many cases, if the stomach will retain it, and not be too morbidly affected with its use. † I am aware that many physicians oppose the use of bark in all such affections of the lungs.

When treating of the influenza of 1807,* I noticed this subject in a cursory manner, and adduced some authors of great celebrity in vindication of my opinion. I then referred more particularly to a species of disease which would render these objections more plausible than any that could be started against my present subject.

* For these cannot be cleansed without a cough, and in the act of coughing, the parts affected are lacerated; so that the disorder in a manner increases, or produces itself; for the parts lacerated, are again thrown into a state of inflammation, when the inflammation must come a second time to maturity, and the matter be again cleansed out, &c. *Method. Medendi, lib. 5. cap. 2.*

† See Medical Repository, Hexade 3d, vol. 1st.

The bark has long been recommended in scrofula; if it can be of any service in this disease, the lungs being its seat, need not exclude the use of it. Not only modern physicians of eminence recommend the use of the bark, but also those of a more ancient date. Morton in speaking of the cinchona, says, "It soon safely stops the hemoptœ when present, and prevents it when apprehended. He gives a number of cases, in which he used it with the most happy effect in testimony of his opinion. Brunner confesses he did not believe what Morton said of the efficacy of the bark in an hemoptœ, till he found the truth of it by experience; and particularly in a thin man, subject to a bleeding at the nose, and afterwards troubled with a spitting of blood; at first only in spring and autumn; but in time the return of the complaint grew so frequent, that he was scarce ever free, for a day, from spitting blood, and his body was beginning to waste. Various remedies, and among the rest goats milk, having been used without success, the bark was given, after which the hemoptœ stopt in a few days and the man recovered his health." Brunner found the bark equally successful in a bleeding at the nose.

Torti used the bark in a number of consumptive cases, some of which were in the last stage of the disease before he used it; and although the disease was in these cases too far advanced to be cured, he nevertheless always found it to produce sensible relief for some days, and sometimes, though not always, with a manifest interruption of the accustomed exacerbation. He says, however, that in the case of a boy to whom he gave the bark at the urgent request of his father (expecting no good from it himself) it made a complete cure. He considered the boy consumptive, and he was generally supposed so; besides, he was afflicted with a spina ventosa. He observes that he afterwards saw him walking about the city so fleshy, strong and ruddy, that he scarcely knew him again, and quite free from all the symptoms of both consumption and spina ventosa. Torti relates other instances of consumptive patients being cured

by the bark. Vanswieten says, " I have myself tried the bark in the beginning of consumption, and have not, repented of it. He adds, " I gave the bark under various forms, and for a long time, to a lady of very high birth, who by a vexatious cough and a slow fever, was emaciated without any hemoptœ having preceded: and although her strength was pretty much sunk, and she spat pus and had vicious conformation of the chest, yet she perfectly recovered."

Previous to using this medicine, Brunner and Torti had no faith in it, in these affections, and the latter gave it with much reluctance; therefore their testimony cannot be considered the child of blind prejudice, but of conviction, generated by unquestionable facts.

The justly distinguished Mead, gave the bark with advantage in hemoptysis, although he did not think it proper in confirmed consumption.

I shall conclude these remarks on the use of the bark in these diseases of the lungs, with the following extract from my history of the diseases of Queen Ann's county, Eastern Shore of Maryland, as contained in the second volume of Coxe's Medical Museum.

" During the spring season, catarrhal affections were frequent, and generally pretty easily cured by such remedies as are usually applied in that disease. The only obstinate catarrhal affection that I met with during my practice here, was that of a gentleman of an impaired constitution, who had long since been troubled with phthisical affections. He tried a great number of the medicines so generally prescribed in this disease, without the wished for effect. The disease still increasing, he became much debilitated and almost exhausted; his cough was very severe; every precaution was taken to prevent its return, and palliatives were given to shorten its duration, but in vain. In order to support the system, the bark was prescribed in as large quantities as his stomach would bear: this medicine had a far more happy effect than I anticipated; it not only supported the system, but also cured my patient.

Should the reader object to the authorities quoted as too antiquated, I would merely reply, that however antiquated they may be, some of them ranked amongst the first physicians of their age, and are even at this day looked up to with medical veneration. And we appear to be as unsuccessful, if not more so, in the treatment of these diseases, in this enlightened age, as the faculty were in ages that are past. This want of success cannot be owing to our better knowledge of them, nor to our treating them more judiciously.

The necessity of distinguishing between the different species of disease, and of studying the constitution of the patient, is obvious, for in cases of hemoptœ, if the patient be of a full or plethoric habit, the bark which has been and no doubt now is, so salutary in emaciated constitutions, would be very pernicious. These remarks are equally applicable to the consumption; and even in the scrofulous species we should not be too precipitate in its use.

In scrofulous affections of the lungs, the diet must not be so generous, as in other diseases of that nature, yet, that abstemious regimen, which is so salutary in a consumption from pneumonia, &c. is certainly very deleterious in this species of phthysis. In this species of the disease, the regimen should be nourishing but not heating.

In treating this disease we should endeavour to increase the tone of the general system, but sedulously avoid increasing the arterial action. At first, this may seem paradoxical; but we know that in diseases of great debility, the pulse is often more frequent, indeed always so in the phthysis, than in health, and that the tone of the general system may be increased without increasing the frequency of the pulse. Indeed as the system gains strength, the pulse becomes less frequent and more regular.

We should not only guard against a too stimulating diet, and one of a difficult digestion, but should also take care that too much is not taken at a time. If the stomach is surcharged, it will be morbidly affected, and this affection will soon be communicated through the nervous influence, to every, even

the most remote parts of the system; as is frequently the case, even in health, after a full meal. In this case the lungs and brain are prominent sufferers. When the stomach is much distended, it is supposed to lessen the cavity of the thorax, by compressing the diaphragm. It is very probable that when the stomach is thus distended, that if it does not compress the diaphragm, and thus lessen the cavity of the thorax, that, from its contiguity to this membrane, it irritates and excites coughing. In persons labouring under the phthysis, the lungs and diaphragm appear to be morbidly irritable, and the least irritating cause produces cough. This is a fact which must be well known to every physician of an extensive practice. After becoming acquainted with the nervous association and influence throughout the general system, this is not surprising; and still less so, when we trace the *par vagum*. However, there are other pernicious effects from taking too much diet at once. The heart, stomach and lungs are very intimately related, and have a material influence over each other; and when one of them is diseased the others participate. In this connection, the lungs appear to hold the most prominent station. When the lungs refuse or cease to perform their function, animation ceases; when they perform it imperfectly, animation is imperfect; if they never perform it, we can never with propriety be called animated beings; hence Brown contended that life is a forced state.

The lungs are excited into action by the atmosphere; the atmosphere is inhaled into the lungs, and whilst there, a chemical decomposition takes place; the azotic and carbonic acid gases being expired, as obnoxious to life, while the oxygen is absorbed by the blood. This decomposition and new combination is necessary to health. When a deviation from this general rule takes place, disease ensues. If there is too much oxygen in the air and the lungs are diseased, it irritates them and proves injurious; as has been proved by the pneumatic physicians. I once witnessed this fact in a paralytic patient, to whom my preceptor administered it. If the air

is not sufficiently oxygenated, respiration is laborious and difficult: therefore this is too important a subject in phthysis not to have claimed more attention than it has. Too pure an air, or one too impure, are both pernicious; and while we guard against the one as too stimulating, we should avoid the other as not sufficiently so. But when the air is as congenial as possible to health, if the lungs are diseased, their action must also be diseased. And I suspect, that in the consumption, the chemical decomposition of the air in the lungs is less perfect than in health, and that less oxygen is absorbed by the blood. This conjecture is rendered probable from too circumstances. 1st. I suspect there is not that aptitude for oxygen in the lungs of consumptive people, as in those who enjoy good health, for what is generally termed a pure air excites a coughing; hence Beddoes suggested the propriety of consumptive patients living in cow houses. 2nd. Pus, discharged from consumptive lungs, indicate a want of tone in the parts.

Oxygen increases the tone of the general system, and should therefore increase that of the lungs. It is not only the tone of the vessels of the lungs that is impaired in consumption, but the solids in general are; and in this general loss of tone the stomach greatly partakes, hence indigestion, &c. is the consequence. This would be a sufficient reason, were we destitute of another, for guarding against improper diet or full meals in the disease in question.

When the tone of the stomach is impaired, if too much food is taken, or such as is difficult of digestion, a pain in the stomach succeeded by diarrha is the consequence, and each of these complaints are very hurtful to the general system.

(To be continued.)

N. B. The remarks above, relative to the decomposition of the air in the lungs of consumptive persons are conjectural. It may be as I suppose; it may be the reverse, or it may be that the lungs in this respect do not deviate from the

general law of nature. Be it as it may, it is certainly an interesting subject, and one which I hoped to have fully investigated before this day, but have been prevented from pursuing the investigation by having partly declined the practice of medicine. Should the publishing of these conjectures, even should they be proved erroneous, be a means of exciting some votary of the healing art, to take up the subject and determine the point, I shall be gratified with the belief that I have done the cause of humanity some small service; and he who shall do it, will not only receive honour in this century, but in ages yet to come for the deed.

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Sanford on the Peruvian Bark.

SIR,

THE importance of making any improvement in the preparation of so valuable a medicine as the Peruvian bark, is obviously so great, that if any hints herein stated should be deemed to promote that effect, I shall not doubt but that you will receive this indulgently. No article of the materia medica has probably undergone so many and varied experiments for this purpose, as well as for ascertaining its virtues, as the bark.

In the early periods of its use, the ill consequences that followed its misapplication, or indiscriminate use in every malady that bore the slightest analogy to those which had yielded to its influence, procured it many enemies; while latterly, the inferior quality or condition of the article itself, has had no less weight in producing a very considerable luke-warmness in its character.

The prejudices arising from the first cause, were dissipated in proportion as the improvements in pathology advanced. Since many diseases, exhibiting apparently the same weakness and general phenomena, are now well known to proceed from two opposite and contrary conditions of the

system, the one requiring increased, the other diminished tone and action; hence directing the physician's attention to the existing error instead of the name of the disease; it seems probable that we have arrived nearer to certainty in the application of this, as well as we have done in the use of the lancet, and many other material remedies. But the indifference depending on the second cause has still much reasonable foundation. As the inferior quality and bad condition of this article are predominating with increasing effect, and seem likely to diminish, if not destroy its importance to the healing art, I think it cannot be deemed useless to investigate the causes of this depreciation.

Before the immense importations of inferior and spurious kinds of bark with which our markets abound(and which the relaxed state of Spanish authorities in South-America have favoured) we had but little cause to complain of their quality; but in the present state of this article, it is no less necessary to discriminate in the choice than it is in its administration.

Until about the year 1790, there were only two species of bark in use, to wit, the pale and red. Soon after that period, a third species, the yellow, was introduced; and at this time there are nearly a dozen different varieties, principally of the yellow kind, selling under the boasted title of Cinchona. About the year 1790, the exorbitant price of red bark encouraged a spirit of adventure in search of that article, which brought into this country a superabundance, a considerable proportion of which, although agreeing in colour, with the genuine, was found to possess but little medical power. The same causes have more recently produced a similar result in procuring the introduction of many species and varieties differing greatly in colour and quality.

The great difference in the size and thickness of the species, in texture, strength and sensible qualities, as well as in colour, afford the most conclusive evidence, that many different trees, bearing a greater or less degree of affinity to each other, furnish the different barks of commerce at this day.

To point out the uncertainty of relying on the bark as it is now generally met with ; to state some experiments made on different kinds, and preparations deemed of most practical use, without detailing those minuter ones which have been so often repeated by abler epxerimenters, and with such different results ; to point out rules for selecting ; the best mode of pulverizing and otherwise preparing the bark for exhibition ; and to invite your attention to some preparations of my own, is the object of the present address.

It is important in selecting bark to know, that its quality depends more on its texture than on its colour.

Every piece of Peruvian bark, of whatever colour, texture, or quality, exhibits three laminae, viz. the exterior or epidermis, the central or parenchyma, and the interior or semiligneous. These appearances are more distinctly observable in the yellow than in the other species of bark, particularly in the inferior varieties, in which one half or more of the inward surface appears to be composed of strong parallel fibres, of a woody nature, difficultly reduced to a fine powder, and possessing but little sensible properties. The great or small proportion of the parenchyma, if sound, compared with the woody portion, serves as the best criterion for choosing bark in the crude state. In the best parcels, the parenchyma prevails nearly throughout the whole thickness of the pieces ; this breaks short and brittle, and appears dense. These appearances generally attend both the pale and red, but with some exceptions.

The epidermis of the pale and red is so thin and so interwoven with their corrugated surface, that no attempts have been made to separate it, the whole mass being ground promiscuously together. But the epidermis (which is an inert and useless substance) being thicker on the yellow, and adhering but loosely to its smoother surface, is principally separated from it before it is exported from South-America, leaving the parenchyma encumbered only with the woody portion.

A particular examination of the following species and varieties which constitute nearly all the different kinds now employed under the name of Peruvian bark, will serve to throw some light on the general nature and comparative value of each. For the sake of reference merely, I have thrown them into numerical order.

N. 1. Superior red. This comes in large thick pieces, has a thin epidermis, which adheres firmly to its rugged surface; is heavy, hard, and brittle, and breaks short and shining. The parenchyma is thick, compact, and plainly distinguishable from the inner semiligneous portion; taste strongly bitter and astringent; smell somewhat peculiar although common to bark; yields under a particular mode and given degree of grinding, a large proportion of impalpable powder, though less than the pale.

N. 2. Inferior red. Light and spongy; comes with little or no epidermis; parenchyma and semiligneous portion not easily dstinguished. This, from the deficiency of its sensible properties and its exceedingly tender structure, appears to be a decayed bark. The whole substance is reduced more easily than any other to a fine powder. This and the preceding, owing to their scarcity and the high price they both have born, are now rarely met with in their genuine state.

No. 3. A firm bark; heavier than any of the others; general thickness from one to three lines; external surface hard, smooth, and principally without epidermis; parenchyma dense and brittle, and constituting nearly the whole substance; semiligneous portion scarcely visible, and breaks with little or no shivery appearance; taste intensely bitter, and considerably astringent; colour in powder a yellowish red, approaching more nearly than any other to the true red bark; smell brisk and common to bark; yields more impalpable powder than any other, except the decayed red last mentioned. This appears to be a strong and valuable bark, lately introduced, but owing to its high price and better demand in Europe, but little has been retained here, and is pro-

bably not to be found pulverized in the shops of this country.

No. 4. Common pale bark; has a thin grey coloured epidermis, which is interwoven with its uneven surface; is mostly rolled up in short thin pieces. In texture it nearly resembles the superior red. The fracture is short, smooth, and shining; parenchyma thick, and scarcely distinguishable from the semiligneous portion; taste bitter and astringent; smell common to bark, but stronger than in the others. Although a hard bark, it affords a large proportion of impalpable powder.

Another kind of the same colour has been noticed, differing but little from the other, except in the size of the pieces, which are larger, thicker and wider.

No. 5. First quality of yellow; in large and small flat pieces, from one half to two lines in thickness; surface slightly corrugated: epidermis very thin and easily separated; parenchyma extending nearly through the whole substance; breaks short and brittle, but not shining, with but little fibrous appearance on its inner surface; colour a rich lively yellow; taste strongly bitter, with slight astringency; smell common to bark in general, with the addition of a slight cinnamon flavour, especially when heated; is capable of yielding a large proportion of impalpable powder.

No. 6. Second quality of yellow. The pieces are thicker and longer than the last mentioned, but not so broad, except a few pieces which appear to come from the tree near its root; thickness from one to three lines; surface shriveled; epidermis thin and adhering closely; parenchyma thick and scarely distinguishable from the more ligneous inner surface; breaks short, but not so bitter and shining as the pale; yields like the former, a large proportion of impalpable powder; taste biter with slight astringency: smell brisk and common to bark, without aroma; colour a pale yellow, approaching to the colour of the pale bark.

No. 7. Third quality of yellow; generally rolled up in the quilled form in larger and longer pieces than the pale:

surface somewhatsmooth ; epidermis very thin, light coloured, and adhering firmly ; parenchyma thin, hard and brittle, and easily distinguished from the semiligneous portion, which is thick, tough and shivery ; thickness from one to two lines ; taste pure, but not strong either in bitterness or astringency ; colour a yellowish ash ; smell common to bark ; yields but a small portion of impalpable powder, the remainder being very fibrous.

No. 8. Fourth quality of yellow. Of this general description, several varieties have been examined, all of which agree so nearly in texture, in the proportion of their component parts and in their sensible properties, as not to require a separate description. General thickness from two to ten lines ; epidermis thick, soft and adhering loosely, with signs of decay; parenchyma about one third of the whole substance, tender and spongy, and readily distinguished from the semiligneous portion, which is light, very fibrous and shivery ; colour in powder a reddish yellow ; taste feebly bitter, and very slightly astringent, and approaching to the taste of rotten wood ; smell weak, with a mixture of flavour common to bark and the faint smell of rotten wood ; yields very readily a small proportion of im palpable powder, while the rest remains shivery, lighter coloured, woody and fibrous.

Another kind of bark deserves to be noticed, more on account of its similarity in appearance when powdered, to some of the others, than on account of any real resemblance in medical virtues, and because large quantities have been noticed in market. It comes in pieces of very uniform length and breadth, which appear to have been sliced from the tree while in sap ; thickness in general from one to three lines, but in some pieces as much as six. In general appearance while in quill, it has a nearer resemblance to the bark of the birch tree than to any other ; colour in powder a reddish ash, inclined to yellow ; external surface hard, and in the larger pieces full of transverse fissures ; smell not common to bark ; taste scarcely bittter, but powerfully astringent. Different from any kind of Peruvian bark, it gives out to

cold water a brownish red colour. It will not cure an intermittent. A cold infusion of it differs from a similar infusion of real Peruvian bark, in remaining like oak bark much longer, free from putrefaction, in producing a ready and copious precipitate with a solution of gelatin, in forming no precipitate whatever with infusion of galls, as the latter does, and in striking with chalybeates a much darker colour. When treated with water and alcohol, it affords nearly twice as much extract as Peruvian bark; which, however, is by no means to be considered as an evidence of superior strength as a medicine, since oak bark, galls, cinnamon, bark of guaiacum, sassafras, and many others, afford a larger extract than Peruvian bark, yet no one ascribes to any of them a tonic power equal to the bark. It is only when the constituent principles of several barks are the same, that the quantity of matter extracted from each by any given menstrua, will serve as a criterion of their relative strength.

The powdered state of all the barks being more favourable than the crude or unground, for judging them by their taste, smell or colour, they are to be understood, when their sensible qualities are here spoken of, as being examined in that state: and the proportion of impalpable powder which is here stated to be the product of particular described barks, is to be understood as meaning the proportion to be obtained under a given degree, and according to a particular mode of grinding and sifting, as is hereafter pointed out for obtaining, in a degree, the resinous or parenchymatous separate from the shivery or semiligneous portion.

To obtain concentrated preparations of the bark has long been considered a desideratum in pharmacy of the first magnitude; but none of its preparations hitherto made, have been found equal in medicinal power to the powder, and no solvent so capable of acting on all its component principles, as the juices of the primæ viæ.

The middle layer or the parenchymatous portion of the bark is that part in which the active principles chiefly abound. To separate this from the more bulky woody matter with

which it is blended, has incited the ingenuity of many skilful experimenters; but owing to the wrong application of pulverizing machines, little progress has hitherto been made towards the completion of this object.

The component parts of many bodies, though intimately blended when endowed with different degrees of friability, are capable of being separated from each other by mechanical means.

Different opinions have been held as to that portion of bark which soonest yields in pulverizing. While some contend that the resin or parenchyma is soonest reduced, others are of opinion, that on account of its apparent hardness, it is the last which becomes a powder. It is difficult to reconcile opinions so contrary to each other, when they are sanctioned by such names as Lewis, Duncan, Coxe, Woodville and others of great authority, without supposing that either very different modes of pulverizing were adopted, or that barks differing greatly in texture, were employed by each.

Resinous hard and solid bark, when triturated with the pestle, adheres more or less to it and the mortar in which it is ground, and the longer the friction is continued in this way, and the smaller the quantity employed, the greater will be the agglutination of the best part of the substance. In this case, a certain portion of the resin gets into hard and solid masses, while the ligneous portion seems soonest to be in the powdered state. But if bark of the same description be placed beneath the operation of two vertical stones of modeate weight, turning within a small circle, and in sufficient quantity to preserve a separation of the rolling stones from the plane beneath, of one inch or more, until the operation is completed, a contrary result will follow. In this case the more resinous portion does not agglutinate by coming into close contact with the levigating bodies, and in consequence of its greater degree of friability, is sooner than the other reduced to a subtil powder, while the remainder, still preserving the fibrous state, is more slowly reduced. To favour the separation of the fine, more spherical figured par-

ticles which are the product of the pulverized parenchyma, it greatly promotes the design to have the sieve preserved in a horizontal position, and to have the necessary agitation performed by motions in that direction. By these means most of the oblong fibrous particles, however minutely divided, by lying across the fine meshes of the sieve, are prevented from passing. When, therefore, the object is to obtain from the general mass of bark employed, a certain portion of its substance separate from the other, in a stronger and finer state than the remainder, the mode of both grinding and sifting last described is best adapted to promote the design. The superfine powder thus separated is observed to be of a much higher colour than the residue. This by further grinding may be reduced to an inferior powder, or may be advantageously used for tinctures, infusions, or for the preparation of the essential salt hereafter mentioned.

On the contrary, when the object is to obtain an uniform powder of the bark, consisting of all its component parts, the heaviest weights are to be employed, and to accelerate the grinding, are made to operate on small quantities at once, until it is uniformly crushed and sufficiently broken to pass chiefly through the bolt. The bolt, for better dispatch, is to be constructed and acted on in the same manner with those employed in factories of grain.

Thus, the different modes of obtaining different qualities of powder from bark of a given kind, are made to consist in the different degrees of weight and force employed, and in the manner of their application, whether on large or small quantities at once, whether by simple trituration, or by the combined action of pressure and trituration; while the different mode of separation are made to consist, not only in the fineness of the sieves, but in the manner of applying the pulverized mass to the sifting machine, whether this be done on an horizontal plane, with agitation in that direction, or whether it be done by means of the customary bolting cloth, with circular motions and perpendicular agitations.

The term resinous portion is here used in the broad sense in which it has been used by most writers, to mean that middle, brittle, and parenchymatous portion, which contains the largest proportion of its active parts.

All the descriptions of true bark herein noticed, have been repeatedly administered in the course of many years practice, with a particular reference to the comparative strength of each, as well as to the comparative value of the powder obtained in different ways; from which I am enabled to say (as far as the varying circumstances of the different cases in which they were used would allow) that the efficacy of those which have been analyzed, corresponds with the quantity of concrete obtained from each, as exhibited in the following table.

Of No. 1. 2 and 7, it is regretted that the samples on hand at the time the others were submitted to experiment, were not sufficiently large to test them likewise by means of the concrete they might afford; but their comparative value has hitherto been determined by their efficacy in actual practice, and by their sensible properties.

No. 1 is high in its sensible qualities and powerful in its operation.

No. 2 is inferior in sensible qualities and feeble in medical virtues.

No. 7 is not high in sensible qualities, and on account of its tough and fibrous texture is rarely made fine enough to be valuable in powder.

In each of the following experiments one ounce avoirdupois of bark was employed. The quantity of water poured on in each infusion was one pint. The mixture was stirred occasionally for three hours, and then allowed to settle twenty-one more. The decanted liquor was passed through filtering paper, and the evaporation immediately commenced in shallow earthen plates set either in the sun or in an open oven heated to a temperature below 150° of Fahrenheit, and gradually reduced towards the close of the evaporation, until the product assumed a shining vitreous appearance, some-

what similar to dark coloured gumarabic. In the experiments with proof spirit, half a pint was poured on the residuum left after three watery infusions; the mixture was agitated daily for eight days and decanted on the tenth. The menstruums employed were of the temperature of the atmosphere. Many trials were made with tepid and hot infusions, but with little increase in the quantity of the product. Decoctions increased the quantity but injured the quality. The addition of vegetable alkali, magnesia, lime and ammonia to water in different proportions did not appear to increase its solvent power, but changed the taste of the product to a nauseous bitter.

	Quantity of concrete extracted by water in grain.				Concrete extracted by proof spirit after water in grains.
	1st inf.	2d inf.	3d inf.	Total.	
Superfine powder obtained from No. 3,	45	18	8	71	
Proof spirit on the residuum after the three watery infusions,					25
Remainder after the above superfine had been sifted out,	38	15	3	56	
Proof spirit on the residuum after three watery infusions,					20
Superfine powder obtained from No. 4,	35	15	1	51	
Proof spirit on the residuum,					21
Remainder after the above superfine had been sifted out,	30	12	2	44	
Proof spirit on the residuum,					17
Superfine powder obtained from No. 5,	43	18	7	68	
Proof spirit on the residuum,					20
Remainder after the above superfine had been sifted out,	33	14	2	49	
Proof spirit on the residuum,					13
Superfine obtained from No. 6,	40	13	2	55	
Proof spirit on the residuum,					17
Remainder after the above superfine had been sifted out,	28	9	3	40	
Proof spirit on the residuum,					13
Superfine obtained from No. 8,	14	6	1	21	
Proof spirit on the residuum,					14
Remainder after the above superfine was sifted out,	9	3	2	14	
Proof spirit on the residuum,					9

The substance obtained from bark, when treated with water as above, has acquired in Europe the name of Essen-

tial Salt. How far the addition of the spirituous concrete obtained after water, may add to the value of the salt, and whether its value will compensate for the expense of preparing it, remains to be determined by further experiments.

This preparation I believe has not as yet entered much into the prescription of the physicians of this country, or been the subject of as much attention as it seems to merit.

Dr. Reece, in the 4th London edition of his work entitled "Medical Guide," has noticed the salt in terms of high commendation. He says it has been extensively employed by himself and many of the principal physicians in Great Britain; and in cases where the powder cannot be used, it is considered an article of inestimable value. Ten grains are stated by him to be equal to one drachm of the best powder.

"The tincture of the bark, on account of the quantity of spirits necessarily employed, is in many cases inadmissible; while a dose of the infusion, adequate to ten grains of the essential salt, would be more than the stomach would retain, or the patient be persuaded to swallow. From these great objections this salt is exempt. Its being soluble in small quantities of either vinous or aqueous menstruums, and its convenient form for being used in pills, renders it extensively applicable in cases where the powder cannot be duly administered.

This substance, like some of the deliquescent salts, absorbs moisture greedily, and after exposure to a moist atmosphere, it parts with its yellowish colour and vitreous appearance, and assumes, first, a gum-like; then a syrup-like consistence of a dark brown colour. The change thus wrought on this article by the admission of moisture, while it does not materially injure it as a medicine, destroys in a measure that characteristic appearance, by which its genuineness is to be judged of.

I find that a solution of the above concrete or salt, in the same quantity of water which originally held it in solution produces, on the addition of red sulphate of iron, the same

succession of dark and green colours that were observable in the infusion before evaporation.

An infusion of galls, added to a fresh cold infusion of yellow bark, produced a copious white precipitate. A solution of the salt of equal strength with the infusion, on the addition of galls, let fall a precipitate precisely similar in colour and quantity.

On the addition of a solution of gelatin to a fresh cold infusion, little or no precipitate could be distinguished. The same result followed the addition of gelatin to a solution of the salt.

A solution of red sulphate of iron (fifteen grains in one ounce of water or spirit) when added to eight times its quantity of the tincture obtained from the residuum of bark after maceration in water, and which afforded the concrete in the last column, gives it a dark green colour and turbid appearance. When the concrete is re-dissolved in the original quantity of spirit, the solution undergoes the same change on the addition of the chalybeate.

The above tincture affords, on the addition of either infusion or ticture of galls, a very small grey coloured precipitate. A similar precipitate is deposited by a solution of the concrete on the addition of galls.

When water in a large proportion is added to the tincture above mentioned, a floculent precipitate is formed. When the concrete is redissolved in proof spirit, and water is added, a precipitate is likewise formed, similar to the other in appearance and quality.

The experiments made on these concretes, being calculated to ascertain the existence of several of those proximate principles on which the virtues of the bark are supposed to depend, prove, that they contain those principles unchanged. As to sensible properties, they retain much of the taste peculiar to Peruvian bark. It will be perceived that the principal difference between the mode of preparing this, and the common extract of the bark, depends on the application of moderate heat in preparing the one, and the higher degrees

in the other. It is now generally admitted, that the great heat which is usually employed in making the extract by long boiling, destroys that just combination of its constituent principles on which its medicinal power depends. Does the great heat employed, the agitated state of the boiling liquid, or both united, by favouring the absortion of oxygen, produce this effect?

Among the causes which have lessened the usefulness of the bark, its misapplication and depreciated quality have been noticed. Another cause of miscarriage has been owing to the small quantity administered. It is with this, as it is in the use of many other permanent stimulants (mercury, for instance) that no beneficial effect is experienced until the full quantity is given which corresponds with the lost excitement. If, instead of giving infusions and decoctions in the frivolous quantity of two or three spoonfuls, or the tincture by tea-spoonfuls, as is too frequently the practice even in cases of urgency and danger, the powder were to be administered in the dose of a drachm or more every hour or two, or if it were injected into the lower bowels in still larger quantities, less frequent complaint would be made of its inefficacy. Not a few are the number of cases wherein the invigorating power of the bark is most imperiously demanded, where the requisite quantity of the powder cannot be retained on the stomach. In nearly every case thus circumstanced, the desired effect may be expected from liberal injections of this substance. I have witnessed more sudden and complete effect from bark exhibited in this way than from any other. (This may be owing to the large quantity used.) One ounce or more of fine powder incorporated with twelve ounces of starch mucilage and fifty or sixty drops of liquid laudanum (where that is admissible) will generally be retained, especially if mechanical pressure to the rectum be made for the first half hour. This quantity of bark, with thirty or forty drops of laudanum may be safely repeated three or four times in every twenty-four hours.

Intermitting and remitting forms of fever generally affect aged and infirm people dangerously, and when they rage epidemically are often noticed to be malignant, and more or less mortal to persons of every age and description. In cases like these, and many others, where the stomach cannot receive the requisite quantity without the debilitating effect of vomiting, bark injections become indispensable to the safety of the patient. I have known very many persons, from these and other causes, affected with coma, vomiting, cold extremities, paralysis of the sphincter muscles, almost imperceptible pulse, &c. speedily restored by the liberal use of bark in this way. Repeated experience furnishes the most conclusive evidence to my mind, that the human system is not less speedily and effectually acted upon by bark, in the appropriate quantity, through the medium of the lower intestines, than it is by means of the stomach: in fact, whenever this organ has lost much of its excitability by the too liberal and long continued use of ardent spirits, opium, strong and high flavoured tea, and other high stimulants, it is manifestly the part less adapted than the lower bowels, to impart to the whole body the effect of this and some other medicines. This pleasant method of administering medicine adapted to the excitability of the part, has, it is true, been noticed by many writers on medicine, but in so incidental a manner has it been done, as to render the hint almost nugatory. Thousands have doubtless been abandoned to their fate, because the bark could not be retained on the stomach; many of whom might, by this practice, have been saved to bless the great Author of all good for giving to mankind this divine remedy.

However extensively this invaluable drug may apply to the catalogue of human infermities it approximates no neare to an universal remedy than the lancet does. Like that, its power of controlling a certain description of morbid actions renders it equally mischievous in those of a contrary state. Although extensively useful in intermitting forms of fever, it cannot be universally so. The intermitting and

remitting forms of fever, as well as others, are now known to assume, in different places and seasons, and with different persons, very various and contrary characters. Whenever fevers of this description are characterized by a hard pulse, inflamed eyes, great pain in the head, stomach or intestines, with oppression of the breast, &c. no practitioner would think of curing them without having recourse to the lancet, and other depleting remedies. When symptoms of a contrary nature supervene, the lancet would be as prejudicial as the bark beneficial.

It is worthy of particular remark, that intermittent fevers rarely, if ever, assume at their commencemen the tonic or atonic character on which our indications of cure are subsequently formed. Those which might, by a repetition of paroxysms, assume in their further progress the tonic or inflammatory diathesis, are as certainly cured by the early use of the bark, as if no such predisposition to phlegmasia had existed. It is in this early stage of the disease, before the morbid actions of the system are habitually confirmed, or the glandular secretions are materially vitiated, that it is best subdued by the bark. The evacuation of the primæ viæ so generally, premised to the use of the bark, is here to be dispensed with, on account of the delay which it occasions, and because the state of the secretions does not require it. In that intermediate and doubtful state of the excitement which attends not only these, but some other periodical diseases, we may venture, with greater confidence, on the borders of the inflammatory state, with this remedy in our hands, than with any other tonic of the materia medica.

The yellow is that species of bark which is now most generally preferred in the United States. It is on this account, and because the best descriptions of this kind are thought to be equal, if not superior to those of other colours, that I have latterly had this kind powdered, and put into market. The superfine powder is obtained from that variety which we have denominated first quality of yellow (No. 5.) in the proportion of about two parts of the superfine to one of the re-

mainder. The preparation has been more successfully employed (given in two-thirds the usual quantity) during several years of my practice, than any other heretofore made use of, and the testimonials of many other practitioners to whose judgment it has been confided, being equally in its favour, it is not on slight grounds that it is recommended to your notice.

The first account of the preparation and uses of the concrete or essential salt of the bark, was noticed in the London Medical and Physical Journal, vol. vii. The more particular remarks of Dr. Reece, and other physicians with whom he has corresponded, on the merits of this article, go far to encourage its use. I have given it a few trials in cases of distinctly marked intermittents, in the dose of ten grains to adults, in the form of pills, every two hours, during the intermission, with uniform success; and in several cases of chronic debility which have recently been under my care, it has had the happiest effect, when given by itself, or in combination with chalybeates. In consequence of the evidence thus furnished in favour of this preparation, I have been induced to construct an evaporating furnace for the purpose of preparing it in the large way; and should the result of the further experiments which are now in progress, not tend to invalidate the opinion already formed of it, I propose to supply those agents who may have charge of the superfine powder, with this article likewise.

After more than twenty-five years observation on the effect of bark, as a medicine, in different situations best calculated to give it an extensive trial, as well as ten years attention to the different ways of pulverizing and otherwise preparing this substance for use, it may not be thought arrogant to lay claim to confidence in regard to the facts and principles herein contended for. A few experiments, if made with attention to accuracy, as is here pointed out, and (what is a surer criterion) a few trials made with these preparations in well adapted cases of disease, may determine them satisfactorily.

Should the above remarks and observations, by exciting a spirit of further research on the subjects to which they relate, prove in that or any other way useful, it will answer the wish of

Your obedient servant,

CLARK SANFORD,

Greenwich, Connecticut, June, 1811.

Nathaniel Potter, M. D.

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To the Editor of the Lycæum.

SIR,

AFTER reading Dr. Dallam's paper in the first number of the Lycæum, I resolved to try the effects of the Cotton in burns, in the first case that occurred in my family; and it soon happened that a case presented itself, for one of my children was scalded with boiling water. The Cotton was immediately applied, and a cure was effected by it alone, without an ulcer or even a blister. There was nothing extraordinary in this case, except the shortness of the time in which the cure was performed. Several other cases have fallen under my observation, and in every instance with the same happy result, none of which it will be necessary for me to state except my own, which was far more alarming, because the accident was occasioned by a different agent in combination with the matter of heat possessing a greater capacity for heat, and of a more adhersive quality than common water.

On the twenty-fourth of June, as I was preparing a plaster for a horse's back, I had the misfortune to spill *boiling rosin* (one of the ingredients) over the back of my hand, from the wrist down to the ends of my fingers. Such was the excruciating agony of the pain, that I threw myself on the floor, in a state of distraction. I laid there about three minutes, when some grease was brought for the purpose of disengag-

ing the rosin. By this application, aided by the heat of the fire, to which I held my hand, the rosin was got off in about fifteen minutes, during which time, I suffered extreme pain. The cotton was applied in about twenty minutes from the time I received the injury, and in half an hour after the application, I felt no pain except at the end of my little finger. There the pain still continued, except when I pressed the cotton close to the part, and then it immediately subsided. I could not give the same degree of pressure to my little finger, as to the other parts of my hand, unless when I occasionally used my other hand, and thus the cotton was not kept so uniformly in contact with the part affected. Twenty-fifth—Continued free from pain, except my little finger, which was blistered: this convinced me that the closer the cotton can be pressed to the parts the better. Twenty sixth—The cuticle of the little finger is broken; but all the other parts are free from pain, and all appearance of disease. I this morning applied the cotton to the little finger only. Twenty-seventh and twenty-eighth—Free from pain. Twenty-ninth—Omitted the cotton altogether, and suffered much pain in my little finger. On the morning of the 30th, I perceived a yellow deep-seated speck, as if pus were beginning to form. I cut down to it and applied the cotton as before. July first, a very small discharge, but no pain. Second, omitted the cotton and continued well. It is to be remarked that the cuticle of the whole back part of the hand, fell off three weeks after the accident, although no vesication had taken place immediately subsequent to the burn.

Yours,

JOHN HASLAM.

Baltimore, September 24, 1811.

Haydin's Geological Sketch of Baltimore, &c.

Baltimore, July 12, 1811.

IN attempting a brief geological sketch of Baltimore and its vicinity, it seems unnecessary to wander far in search of proofs to convince the most superficial observer, that water has been the principal agent in forming almost all the inequalities of hill and dale, that present themselves to view either in an easterly, westerly, or southern direction.

The superincumbent soil in the neighbourhood of Baltimore, and even for many miles distant, (except in some interval) is a mixture of clay and sand, in which the former predominates; hence, it is not very productive in itself, but susceptible of the highest as well as most lasting state of improvement and cultivation.

After penetrating this stratum, which varies in thickness in different places, we next come upon a wave-like stratified bed, or vein of sand mixed with a brownish loam or ferruginous substance, which often presents to view in the side of a bank recently cut down, a very handsome appearance.

The declination from the horizon of this stratum, differs in its degree and direction, as to the points of the compass, but bears mostly the appearance of having been once washed by a current, the direction of which has been south or south-westerly. This stratum is occasionally intermixed with or interrupted by extensive beds of quartz and other pebbles of various colours and dimensions, which in some instances form the superincumbent surface; at others the second stratum, and in some the third; constituting with the following, four different strata. Immediately below the second stratum (or the third where there is a bed of quartz pebbles) we come upon an immense bed of very fine white silicious sand, presenting undulating shades, and occasionally exhibiting nodular masses, and sometimes considerable beds of very white argillaceous grit. This bed of sand is not only useful for a variety of domestic purposes, but is of impor-

tance to plasterers and bricklayers. It commences at from ten to fifteen feet below the surface, and extends to a great depth; perhaps at present unknown; yet there are circumstances that lead to a conclusion, that it is limited in its depth, at or a little below tide water. When the water company were digging the canal for the purpose of conveying the surplus water from the hydrant and new mill (belonging to the water company) into the present course of Jones's Falls, they were obliged to cut across the ancient channel of the above stream; which course it had left many years since, and to a depth, greater perhaps than has been opened in any part of the city. The bottom of this canal, which was from eight to ten feet below the surface, and five feet below tide water, and nearly one hundred below that on which the Cathedral is building, presented a bed of pale blue argillaceous grit, occasionally intermixed with veins of chloritic earth, or chlorite in a pulverulent state, forming a stratum extremely tenaceous and hard.

From this, and other indications, there is much reason to conclude that there are argillaceous strata, or beds of considerable extent, not only in the neighbourhood of Baltimore, but in various directions about it. Between the city and Fort M'Henry they are presented to view in different places, at tide water, of various qualities and colours; such as redish brown, dark brown, pale blue or slate, white, &c. some of which are of a very fine quality.

On the opposite shore at Moales' Point, and near Messrs. Dorseys iron ore tract (which is of the argillaceous kind) there are extensive beds exposed to view at tide water, some of which are excellent, and might be turned to considerable advantage to the manufacturer.

In numerous instances the mind is often very much assisted in forming an opinion of the geology of a district, by the various substances, which at different times, are raised from a very considerable depth below the surface. In this respect, however, very few opportunities have been presented, which are calculated to throw much light on the subject under con-

sideration; one however, it may not be amiss to notice. Mr. ——— in digging a well in that part of the city east of Jones's Falls commonly called Old Town, came upon a mass of wood, evidently black walnut (juglans nigra) with a part of a nut of the same species, at the depth of twenty-one feet from the surface; both of which are deposited in the Museum in a good state of preservation. These, in all probability must have remained for ages at that depth below the surface, since there is no possible evidence of the current of Jones's Falls ever having overflowed that part of the city in any direction, it being from eighteen to twenty feet above the present surface of the stream.

The most conclusive evidence however, in favour of the agency of water in producing the present appearances (at and below the surface as far as we are acquainted) is a stratum of iron stone, which is considered, I believe at all times and in all places as an unequivical proof of secondary formation. In no instance, perhaps, can it be more strikingly so than in the present one. At from eight to ten feet below the surface of the eminence on which the Cathedral is at present building, and in some instances at a less depth, this stratum presents itself, and is in general from six to twelve inches in thickness, preserving in its extent, almost an uniform level, conforming however, to the inequalities of surface on which it was primarily deposited and formed. It is composed mostly of masses of from one to fifty pounds; presenting a great variety of forms; some thick, others thin, wave like, round, hollow, &c. I have seen a piece of it in the form of a complete hollow cylinder open at both ends. It is composed mostly of the argillaceous and silicious iron stones, with some indications of what I consider the carbonaceous kind: but in no instance that I am acquainted with, has the calcareous, bituminous, or granulated iron stone appeared among it. It preserves its level, or nearly so, until by the descent of the hill, it runs out, and is not seen again except on nearly the same level in a high neighbouring hill, as in several places in a westerly direction,

and beyond St. Mary's College on the Reister's town road, near a mile distant from the first mentioned place. Detached masses of this substance are frequently seen in lower situations, and sometimes in considerable quantities, but I consider this as having, in the course of time, been torn from its natural bed by some physical cause, perhaps by torrents of water cutting through the hill and stratum, leaving the pieces to fall with the bank which in time is washed into the low grounds.

We next see its appearance about half a mile distant on Hampstead Hill, which lays due east from Baltimore, and extending with the hill in a south easterly direction and preserving the same level, until, from the declination of the eminence, it runs out near a mile below, or to the southward, in the vicinity of Harris's Creek. Its next appearance is in a direction due south from the city, in Federal Hill on which the observatory stands, and at nearly the same depth below the surface or summit of the hill, and preserving nearly an uniform level quite through it.

The next highest ground in the vicinity of Federal Hill is on the Patapsco, at Moale's Point, as before mentioned, about one mile distant, in a south westerly direction. Here it appears at a less depth below the surface than at either of the aforementioned places, the land being probably somewhat less elevated.

The above mentioned places comprise in the whole nearly eight miles in circumference; throughout which, as well as at many places where it is discoverable between Baltimore and Annapolis, which is thirty miles distant to the southward and about the same height; this stratum of iron stone preserves nearly the same uniform height above the level of Chesapeak Bay; a circumstance which, while it seems too obvious to have escaped the notice of the most superficial observer, amounts to the strongest proof that the neighbouring country to a much greater extent than I have noticed, is almost entirely of a secondary formation.

As it was not my intention in the first instance, to take a very extensive view of the surrounding country, I shall only observe, that to such as are fond of contemplating subjects of this nature, few opportunities will afford a more interesting field for speculations of this kind, than the one under consideration. If the observer will cast his eye over the extensive scene, and suffer his mind to dwell, for a time, upon the low and far stretched shores of the Chesapeak, fading in distance, if he takes into view the different rivers, their courses, the force and operation of their currents, at their several points of influx, together with the projecting capes, head-lands and sinuosities of the eastern and western shores, with their correspondencies, it would seem impossible for him to resist the impulse of astonishment and surprize that fills the mind, while contemplating the amazing results of operations begun and performed during the period of elapsed ages.

Having briefly noticed the appearances within, and near the city of Baltimore, I shall next offer some remarks on a portion of the same district, which has perhaps, a much higher claim to antiquity than the one above described.

It is a part of the granitic ridge, which lies near the city, and on the foot of which, it may be said, Baltimore stands. But before I proceed to describe the appearances of a part of what is called the Granitic Ridge, it may not be improper to offer some general remarks in relation to its whole extent.

The course of this immense ridge, is mostly in a north-easterly and south-westerly direction; varying however, to almost a due east, and west course, in others, almost north and south. Its southern extremity is at or below the state of Georgia, and extending in the above direction, north-easterly through a great portion of the United States. The Roanoak crosses it at Halifax; the Appamatox at Petersburg; the James River, at Richmond; the Rappahannock, at Fridericksburgh; the Potomac, at Georgetown (Col.) the Patuxent, at or near Snowden's, on the post road to and

from Washington; the Patapsco, between ten and fifteen miles from its influx into the bay; throughout a great part of the above distance, it is obscured by the incumbent soil. It appears again nearly in its whole breadth at Gwinn's Falls, five miles from its junction with the Patapsco. From thence it mostly disappears under the soil untill it is intersected by Jones's Falls, where it appears in most of its breadth. From thence its course is continued through Baltimore and Harford counties, and appears on both sides of the Susquehannah at a great height, and more rugged form than any part of its range with which I am acquainted. From the Susquehannah, its usual course is continued with occasional interruptions, as at Schuylkill, to Trenton. From thence it is continued across New-Jersey to the Hudson River, where, I believe, its highest point appears at Hoboken. Thence it crosses York Island, and appears again, at above and below Hurl Gate, on the East River, (a part of Long Island sound) on the western shore of which, it forms some of the most beautiful situations, and affords, at the same time, some of the most interesting prospects of any that present themselves on the Atlantic coast; Greenfield Hill, (Conn.) excepted.

From Hurl Gate it ranges along the north shore of Long Island, nearly or quite to its north-eastern extremitity, where we lose sight of it by the channel, or passage which runs between Long Island and Fisher's Island. After passing under this channel, it discovers itself again on the Western-Shore of Fishers Island, and at low ebb tide at some considerable distances from the shore; constituting, I believe, what is commonly called Fisher's Island reef, or Race Rock.* From thence it continues its course, rather

*Having had frequent opportunities of observing this reef, and that of Watch Hill, in sailing round them, I have been led to form this conclusion, from the obvious correspondenee in their course and direction, and that of the ridge which ranges along the northern shore of Long Island. However, not having had an

more northerly across Fisher's Island, and passing under the Rhode Island passage through the sound, strikes into the Mainland, opposite the north or northeast end of Fisher's Island, a small distance below Stonington, (Conn.) at a place called Watch Hill, and there constitues doubtless, what is called Watch Hill reef; beyond which, I have neither a general or acquired knowledge of it.

This extensive Granitic Ridge, when viewed in its whole range, forms one of the most interesting geological tracts that presents itself to view in any part of the United States; particularly so, when that part which is comprised within the limits of from Hurl Gate, to the north-eastern extremity of Long Island, and through Fisher's Island to Watch Hill, at Stonington (Conn.) is duly considered.

When all the concurring circumstances are judiciously arranged and duely considered, it is difficult to resist the force of evidence which is offered in support of the opinion, that this part of the Granitic Ridge, once formed the southern boundaries of the states of Connecticut and New York; and that their present winding shores, on the north side of the sound were once extended, gently sloping, to fertalize its base on the northern side, while its base on the southern side, throughout nearly its whole extent, (which in some places is, at present, more than two hundred miles from the sea) were once subject to the ceaseless howling of the insulting billows of old ocean.

Having finished what you may consider an unreasonable digression, I shall resume again the subject of its appearance at or near Baltimore, as viewed in a transverse, or rather oblique direction across the ridge; not neglecting to notice at the same time, whatever may appear interesting in a mineralogical, as well as geological point of view.

opportunity of examining particularly the formation and texture of the masses which compose those two reefs, (except that of being driven in a ship upon that of Watch Hill, which afforded but a poor opportunity for making geological observations) I may, possibly, have been led into an error; for which, I hope this will be a sufficient apology.

The foot of the above ridge, on the south side, appears within the precincts of the city, immediately in front of the county goal, and there forms the bed of Jones's Falls; and probably extends southerly, constituting a complete substratum to the city of Baltimore.

The texture of the general mass is at this place, that of a fine, hard, and compact granite, mostly stratified, exhibiting layers of from two to twelve or eighteen inches in thickness, having a declination, from the horizon of from thirty to forty five degrees. Over this bed, the current has flowed perhaps for ages without producing any material change, except that of forming deep hollow cavities, occasioned by the constant attrition of quartz, or other pebbles. Immediately on the margin of this ridge of granite, there appears a secondary ridge laying in a corresponding direction, composed principally of chlorite* intermixed with occasional masses of the black oxide of maganese and a ferruginous matter.

As we ascend this ridge in the direction of the falls, this granite gradually changes its texture by almost imperceptible gradations, until at the distance of one mile from its southern border, it runs into a coarse kind, where the fel'd-spar predominates, so as to render it unfit for the purposes of building, or other branches of masonry.

Immediately above this, it assumes nearly the texture of the first mentioned, being fine, hard and compact, and gradually passing through the above transitions, until, at one mile and a half from Baltimore, it acquires a texture, such as to render it highly valuable and useful in various branches of masonry, and as such, is here quarried on both sides of Jones's Falls to considerable advantage to the proprietors.†

* This ridge of chlorite lies but a few rods above the canal before mentioned, where the veins of chlorite appeared among the argillacious grit.

† Independent of the great advantages this ridge affords, in different places to the various purposes in building, &c. it has been, and ever will be of no small importance to the several road turnpike companies, and would be of still greater utility were they

At this place its highest point is about sixty feet above the surface of the water in the creek, and is decidedly stratified throughout in layers of from two to thirty six inches in thickness, presenting various degrees of declination.

Here, are presented a variety of other substances that mostly accompany granite. Such as veins of pure quartz, feld-spar and quartz, the former of various colours; feld-spar quartz and granits, adularia, or moon stone, beryll, &c.

to confine themselves more to the use of such materials as it affords, and less to the indiscriminate use of such as present themselves in different parts of the country through which the roads pass, of which there are at present, no less than four, runing from Baltimore in different directions, and crossing this Ridge.

It is not my business in the present instance, to point out, if I were capable of doing it, the variety of substances that ought only to be used for the purpose of making roads; or those on the contrary, that ought not to be used.

Suffice it to say, that there are a great variety of substances that are of themselves, when exposed to the air, &c. decomposable, or easily ground into sand or dust; so that when such materials are used in turnpiking of roads, they soon experience one of the above changes; and the consequence is, that of necessary repairs. This being done, probably, with the same kind of materials, being nigh at hand, or in the neighbourhood, soon renders the second repair necessary; consequently, repeated and heavy draughts on the company's treasurer, until the receipts are nearly exhausted, and there remains little or nothing for the stockholders. Whereas on the contrary, if due attention was paid to the selection of such materials for the purpose of turnpiking, as the country abounds with, and which are indistructible, the roads, instead of wanting the usual amount of repairs, would be every year growing better, and no injury to be apprehended from any other source, than that of irrisistable torrents of water.

This want of a little attention sir, is visible in a greater or less degree on most of the turnpike roads, and even in paving the streets of our cities, which often helps to increase the burden of expenditures. I have repeatedly seen the article of maltha, (a bituminous substance generally brought with ballast,) made use of in paving in this city; which you are sensible, is but little better than a loaf of bread for that purpose, for as soon as a cart or waggon has passed over it several times, it is ground to powder or dust; the adjoining stones losing their support, give way, and soon renders repairs indispensable, and additional expences unavoidable.

of which, handsome specimens may be obtained. Also, veins or beds of schistose mica; among which is intermixed considerable quantities of martial pirytes handsomely variegated, presenting almost every variety of colour. Besides which, there is a vein of the shorlaceous actynolite (of Kirwan) both in a crystalized and amorphous state.

This substance shews itself at four different places beside, within the distance of nine miles on this ridge and in a stratum not much thicker than the hand. At Gwinn's falls, it is accompanied by the lamellar actynolite—the fibrous zeolite, the viridescent, plumbaginous iron ore in green martial earth, &c. &c.

Ascending the ridge still farther, the mica predominates in the mass of granite, to such a degree as to render it unfit for any useful purposes. In this part of the ridge particularly, and in its neighourhood may be found handsome specimens of black tourmalin, crystallized in regular sided prisms.

Above the last mentioned part of this ridge, the transition is gradual, and continues with occasional difference of substances to its termination, or rather, where it disappears again under the soil, three miles from its southern border or margin. Here, as well as for some distance below, the mica and fels spar predominate in an eminent degree, particularly the latter, which is in considerable masses. This part of the ridge is not stratified, but lies rather in huge, detached masses without order or regularity.

Here it may not be amiss to notice a peculiarity which is observable in this part of the ridge; I have observed that its course was in some instances almost due east and west; at others almost north and south. An instance of this kind is visible at this place and at Gwinn's Falls. The stratified part of the ridge, or southern half has an inclination of nearly forty-five degrees west of south, while the unstratified or northern part runs nearly in a westerly direction, and seems to terminate abrubtly at Gwinn's Falls, at the distance of three miles, (I should judge) from and above the Frederick Town road. The above course of the stratified range is con-

tinued in its south westerly direction until near Gwinn's Falls, it seems to take a direction of about twenty degrees west of south, while the stream or current (the course of which above the ridge is north and south) runs over its bed nearly at a right angle across the ridge, or quite in an eastern direction; after which is assumes a course nearly south; while the ridge, in part is continued down on the west side of the stream and passes the Frederick Town road, a small distance from the bridge erected over the falls at Messrs. Ellicott's mills.

Besides this, in several other places, parts of this ridge appear running almost due south, while the strata appears to lay, or rather stand almost perpendicular to the horizon.

Immediately on the disappearance of the granitic ridge on the north side, and between Jones's Falls and Gwinn's Falls it is succeeded by extensive ridges, or veins of chlorite, intermixt with a variety of other substances, among which are found handsome specimens of the tremolite (or grammatite of Haüy*) and several other substances, interesting in mineralogy.

On the disappearance of the above ridge on the east side of Jones's Falls it is very soon succeeded by indications of serpentine occasionally intermixed with traces of the noble serpentine. This is succeeded by an inconsiderable ridge of granite; a little to the northward of which we meet with steatites, in a range which yields the greatest abundance. This again is succeeded by what is called the Bare hills; and through which the Falls' Turnkike road has recently been cut.

The range of these hills is nearly in an easterly and westerly direction; not high nor much broken. The eastern part of the serpentine range terminates within a small

* The tremolite is also found at Beaver dam, thirteen miles from Baltimore on the York road, in a gangue of pure granulated carbonate of lime. This is so singular that it is particularly noticed by the Mr. Haüy as being found only at the lake of Baikal in Siberia, engaged in the granulated carbonate of lime.

See Haüy's Traite de Mineralogie, Vol. 3, page 283.

distance of the creek which is called Jones's Falls. On the north side they are bounded, in part, by an auxiliary branch of the same creek. When ascending them on the south side, nothing strikingly interesting presents itself in the general view; but when approached from the east side, or viewed from their summits at different points, or from the road on the north side, the mind seems involuntarily to feel the impulse of melancholy. For the thinly scattered soil, which has been, perhaps for ages, slowly accumulating from a few decayed vegetables which some friendly breeze has borne upon its barren surface, is scarce sufficient to nourish a few scattered tufts of grass. A gloomy silence pervades around, while every rood on the serpentine range bears the most decided marks of sterility. The stones which cover its surface in many places, and of which the hills are mostly composed, bear the evident marks of a partial decomposition, which gives the whole a smoaky, brown appearance, as if it had been subjected to perpetual sulphurous exhalations, or steams of subteraneous fires. If a fratricidal Cain had here committed his Heaven insulting deed, we need not wonder; it bears so much the appearance of having experienced the unappeased wrath, the eternal curse of an offended Deity. Scarce a solitary lizard, or a creeping ant is here seen, seeking among the mouldering serpentine a peaceful borough in which to deposit its daily spoils, and screen its tender offspring from the chilling blasts of winters wind, which sweeps in triumph over this dreary waste. Besides the interest which it excites on account of its gloomy aspect, few districts present a more interesting field in a mineralogical point of view than the one under consideration. The principal eminence appears to be composed mostly of an inferior kind of serpentine, even that which is raised from the depth of forty feet below the surface, is of a loose, and somewhat friable texture; and at the same time intermixed with a variety of substances of the magnesian genus; such as the amianthus, asbestus, steatites, common and foliated; carbonate of magnesia, amorphous

and crystalized; a species of lardite; noble serpentine, and several other interesting substances not sufficiently defined.

But the most important substance that has yet, I believe, been found at this place, is the chromate of iron, of which there are immense quantities.

This interesting substance, of which much has been said in different parts of the world, appears at this place evidently under three different forms, or rather different states. At the place where it has been principally sought for and raised for the different purposes to which it has been converted, it appears in masses pretty compactly formed and of various sizes, as it may happen to be broken up, and among which is intermixed more or less of talc, steatites, &c. Its colour inclining to black, or dark brown. Its fracture, in some instances appears shattered, in others, conchoidal, and in others somewhat foliated, presenting smooth surfaces, having some what the resemblance of brown blend, for which this substance was mistaken in France, by citizen Pontier, who first discovered it; but which, by the analysis of citizen Tassaert, was proved to be the chromat of iron.

At the same place it is also found perfectly granulated, in a gangue apparently of indurated steatites, yet considerably harder. In this substance it appears in innumerable grains of an irregular form, separate from each other, and from the size of a grain of mustard to that of a kernel of pepper, though the latter are rare.

In the next place it is found crystallized in perfect and well defined crystals of an octoedrical form, and from the size of a grain of mustard to those whose facets are nearly one eighth of an inch in length.*

Those crystals have been observed, as yet, only on the eastern part of the hill which constitutes the serpentine range, about one quarter of a mile east from where the amorphous kind is raised or dug up. On this part of the hill are seve-

* Those crystals have, for some time, been considered as octoedral iron ore; but they have recently been tested in this city, and proved decidedly to be the chromat of iron.

ral considerable ravines or gullies, occasioned by water, which, in the course of time, has worn the serpentine, in some places to a considerable depth. In these gullies, the crystals are found washed down and mixed with sand, and a considerable quantity of the granulated chromat of iron.

The exact locality of those crystals, and the granulated chromat of iron that accompanies them at this place, I have not as yet been able to determine; but, from some indications, I am strongly inclined to believe that they were once imbedded in the thick veins of green indurated talc, which, in many places in the sides of those gullies, runs through the serpentine.

Since crystallized chromat of iron is, as far as we have any knowledge, a novelty in the mineral kingdom, permit me to hazard a few remarks on its characters.

Its colour is mostly black, inclining in some degree to steel grey; when held in a bright light it often presents the colours of tempered steel. Surface of the facets of the crystal, untarnished, and smooth as if highly polished. Transparency 0, except in some instances when laid upon a sheet of white paper and in the light of the sun, a rich, deep blood red colour is perceivable. The irregular fracture of the crystals, conchoidal, and vitrious, treated with the blow pipe, infusible without addition; with borax, it gives a bead of a beautiful green. Rather brittle and easily broken, as must appear, for many of the crystals are mutilated, probably by the pebbles rolling over the rocks, and falling on them.

Magnetic in a considerable degree.

Pulverized, the powder or dust is of an ash grey.

The form of those crystals, although perfect octoedrals with regular pyramids in many instances, it does not follow that they are uniformly so in all. In some, the angles of the pyramids are considerably more sallient than in others. In some, the base, instead of being rectangular, is sometimes rhomboidal. In others, the bases, though rectangular, are oblong. In others, one of the pyramids is considerably depressed or flatttened; with others, both are flattened.

The primitive, integral form of those crystals, is tetraedral. This may be ascertained by any person who is desirous of trying the experiment; for the crystals are divisible, parallel only to the facets of the pyramids.

Immediately to the northward, as well as to the eastward of the bare hills the-lime stone commences. This, I believe is its first appearance in the vicinity of Baltimore, which is distant six miles. From this to the distance of twenty miles to the northward, and how much further I am unacquainted, the lime-stone tracts discover a variety of transitions.

In many places, it approaches so near to marble, as to render it not only useful, but highly valuable in almost every branch of civil architecture; and the prospect is favourable, to a supply of such as will answer every purpose of statuary and sculpture in all their variety. I have a piece that was raised at the distance of twenty miles from Baltimore, of exquisite whiteness, fineness and beauty; at which place the lime-stone runs side by side of a ridge of primitive granite, among which are found varied and beautiful specimens of cyanite (or sapparre of Kirwan) such as the blue, green, silvery-white, pale blue, &c. &c. also indurated iron ore in considerable masses.

In the distance above mentioned, there are a variety of other substances not enumerated; among which are the oxide of Titanium, also the Hemætites in beautifully varied forms.

After passing the granitic ridge to the westward, at the distance of five miles from Baltimore, on the Frederick Town road, we come upon a tract, interesting not only in its nature, but for the variety which it presents to view.

It consists of a ridge or vein of agate, varied however in its course, to all the different substances which enter into the composition of agate; such as clear pollucid quarts or crystal, calcedony, jasper, &c. &c. and of various colours.

What other appearanees this vein may discover in its whole extent, I am unable to say, but at the place above mentioned it presents handsome specimens of fine spotted

agate, both disseminated above the surface, and in seemingly stratified ridges or rocks,* appearing a little above the surface.

Its course or bearing is north, about twenty degrees east, and is, I believe, on an avarage, not more than from forty to fifty yards in breadth, in the distance of twelve miles, which is the extent of which I have any knowlege of it.

There is much reason to believe that this vein extends to a great distance to the southward, even to Georgia. For the emethyst is found in Virginia,† and the bur stone that has recently been discovered in Georgia (which is principally composed of marine shells) contains calcedony, and many of the cavities when broken open, presents a beautiful druzy incrustation of jasper and emethyst.

At about three miles in its direction northward of Frederick Town road, the agate is less prevalent, and the calecdony seems to predominate with occasional masses of handsome yellow jasper, susceptible of an exquisite polish.

The calcedony is in considerable masses, and on breaking open a piece, it presents numerous cavities of different dimensions, lined with crystals of quartz occasionally coated with a druzy like paste of a beautiful snow white, yellow, violet colour, &c. &c.

At the distance of five miles from Baltimore, in a north west direction, it assumes more the quality and appearance of French bur stone. At the distance of eleven or twelve miles, and near Randal's Town, it appears in considerable quantities above the surface, equally pure, and in every respect, calculated, apparently, to answer all the purposes of the best French bur stone. On each side of this range are a variety of substances, interesting to such as are fond of mineralogical pursuits, such as horne blend, horne stone, of various colours; likewise, the amianthinite, asbestinite, asbestoid common, &c. &c.

* As such, it is found in Saxony, near Kunmersdorf.

† See notes on Virginia.

Thus far I have endeavoured to give you the most correct information that the nature of my observations will permit, having never taken a single note on the different appearances that have presented themselves in the course of the frequent excursions which I have made in the vicinity of Baltimore.

In whatever I may have erred, it will, I hope, be corrected by some one, whose knowledge in the science is much more extensive, and whose disposition to cultivate and promote it, shall not only equal, but, very far surpass that of

Your obedient servant,

HORACE H. HAYDEN, S. D.

Dr. Nathaniel Potter.

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Saunders on Gum Lac.

DEAR SIR,

As the natural history of many drugs introduced into the materia medica, remains in some obscurity, I suppose every information on the subject will be acceptable, and have therefore sent you an extract from the 79th volume of the Philosophical Transactions, by R. Saunders, M. D. of Boglepoor. W.

AS Lac is the produce of and a staple article of commerce in Assam, a country bordering on, and much connected with Thibet, some account of it may not be an improper supplement to the above remarks.* Lac is, strictly speaking, neither a gummy nor resinous substance, though it has some properties in common to both. Gums are soluble in water, and resins in spirits; Lac admits of avery difficult union with either, without the mediation of some other agent. Lac is known in Europe by the different appellations of stick-lac, seed-lac and shell-lac. The first is the lac in pretty

* Another paper, probably on the country of Thibet, by R. S.

considerable lumps, with much of the woody parts of the branches of which it is formed adhering to it. Seed-lac is only the stick-lac broke into small pieces, garbed and appearing in a granulated form. Shell-lac is the purified lac, by a very simple process to be mentioned afterwards. Many vague and unauthenticated reports concerning lac, have reached the public; and though amongst the multiplicity of accounts, the true history of this substance has been nearly hit on, little credit is given in Europe to any description of it hitherto published. My observations, as far as they go, are the result of what I have seen, from the lack on the tree, the progress of the insect now in my custody, and the information of a gentleman residing at Goalpara, on the borders of Assam, who is perfectly conversant in the method of breeding the insect, inviting it to the tree, collecting the lac from the branches, and forming it into shell-lac, in which state much of it is received from Assam, and exported to Europe, for various great and useful purposes. The tree on which this fly most commonly generates, is known in Bengal by the name of the Biher-tree ,and is a species of the Rhamnus.* The fly is nourished by the tree, and there deposits its eggs, which nature has provided it with the means of defending from external injury by a collection of this lac, evidently serving the twofold purpose of a nidus and covering to the ovum, and insect in its first stage, and food for the maggot in its more advanced state. The lac is formed into complete cells, furnished with as much regularity and art as a honey-comb, but differently arranged. The flies are invited to deposit their eggs on the branches of the tree, by besmearing them with some of the fresh lac steeped in water, which attracts the fly, and gives a better and larger crop. The lac is collected twice a year, in the months of February and August. I have examined the egg of the fly with a very good micriscope: it is of a very pure red, perfectly transparent, except in the centre, where there were evident

* Buckthorn.

marks of the embryo forming, and opaque ramifications passing off from the body of it. The egg is perfectly oval, and about the size of an ant's egg. The maggot is about the one eighth of an inch long, formed of many rings (ten or twelve) with a small red head; when seen with a microscope, the parts of the head were easily distinguished, with six small specks on the breasts somewhat projected, which seemed to be the incipient formation of the feet. This maggot is now in my custody, in the form of a nymph or chrysalis, its annular coat forming a strong covering, from which it should issue forth a fly. I have never seen the fly, and cannot therefore describe it more fully, or determine its genus or species. I am promised a drawing of the insect in its different stages, and shall be able soon to add to a botanical description of the plant, a drawing of the branch with the different parts of fructification and lac on it. The gentleman to whom I owe part of my information, terms the lac the excrement of the insect. On a more minute investigation however, we may not find it more so than the wax or honey of the bee, or silk of the silk-worm. Nature has provided most insects with the means of secreting a substance, which generally answers the twofold purpose of defending the embryo, and supplying nourishment to the insect, from the time of its animation till able to wander about in quest of food. The fresh lac contains within its cells a liquid, sweetish to the taste, and of a fine red colour miscible in water. The natives of Assam use it as a dye, and cotton dipped in this liquid, makes afterwards a very good red ink. The simple operation of purifying lac is practised as follows. It is broken into small pieces, and picked from the branches and sticks when it is put into a sort of canvass bag, about four feet long, and not above six inches in circumference. Two of these bags are in constant use, and each of them held by two men. The bag is placed over a fire, and frequently turned, till the lac is liquid enough to pass through its pores, when it is taken off the fire, and squeezed by two men in different directions, dragging it along the convex part of a plantain-tree, pre-

pared for the purpose; while this is doing, the other bag is heating to be treated in the same manner. The mucilaginous and smooth surface of the plantain-tree, seems peculiarly well adapted for preventing the adhesion of the heated lac, and giving it the form which enhances its value so much. The degree of pressure on the plantain-tree, regulates the thickness of the shell, and the quality of the bag determines its fineness and transparency. They have learned of late, that the lac which is thicker in the shell, than it used to be, is most prized in Europe. Assam furnishes us with the greatest quantity of lac in use; and it may not be generally known, that the tree on which they produce the best and largest quantity of lac is not uncommon in Bengal, and might be employed in propagating the fly, and cultivating the lac to great advantage. The small quantity of lac collected in these provinces, affords a precarious and uncertain crop, because not attended to. Some attention at particular seasons, is necessary to invite the fly to the tree; and collecting the whole of the lac with too great an avidity, where the insect is not very generally to be met with, may annihilate the breed. The best method of cultivating the tree, and preserving the insect, being understood in Bengal, would secure to the company's possessions the benefits arising from the sale of a lucrative article in great demand, and of extensive use.*

* The Lacca that comes to us from Judea in thin plates, is altogether resinous and completely soluble in alkohol, but it is very evident from the preceding account, that the unmanipulated stick-lac contains in its cells, a substance of an entire different quality, soluble in water. This matter is either the ovum or the pabulum. It is the only part used for dying, and for medicinal purposes; is highly praised for its astringent virtues when applied to the gums, as the Germans and Sweeds testify.

The prescription therefore in the Edinburgh Dispensatory (Tinet Lacca) is both unguarded and injudicious, for by it, nothing more than a varnish could be made, containing quite different qualities from these intended; and of course useless, perhaps we shall furnish some remarks hereafter on various other articles of the materia medica. W.

Potter's case of Luxated Humerus.

[As the Recorder in which this paper originally appeared, has long been discontinued, and the sphere of its circulation is therefore contracted, no other apology will be required for the republication of a case that has excited so much interest among the faculty.]

Frederick Siegfred Frede, the subject of the following report, a native of Prussia, sailed from Newcastle in England, on board the British brig Sylvan, Jonathan Ostle master, on the 26th of August, eighteen hundred and five, bound to Baltimore. On the seventh day after they lost the land, the wind blowing very high, and the brig being in a heavy sea, Frederick was ordered with others of his shipmates to hand the maintopsail. Having laid hold on the maintopsail sheet with his left hand, a sudden flaw filled the sail, and instantly backed it with such force, that he was obliged to hold on to save himself from being thrown from the yard. The exertion which this occasioned drew his arm upwards and backwards with great violence, and thereby threw the head of the *os humeri* completely under the *pectoral muscle*. The weather being uncommonly hard, and the winds adverse, the brig had a very tedious passage; twelve weeks had elapsed from the time she sailed from Newcastle before she made Cape Henry, and eleven from the day the accident occurred. During the passage Frederick continued unable to do duty, and after he arrived in port, two weeks had passed away, when his situation attracted the humane attention of their Danish and Swedish majesties consul, Mr. Collin. This gentleman equally remarkable for his humanity and the solicitude he manifests for the interests of the nations he represents, conducted the patient to my house and committed him to my care. He was a muscular, athletic man, about forty years old, but considerably emaciated by the pain and anxiety of mind occasioned by his disaster. Having collected a history of the case from the captain of the brig and the patient, I made a partial examination of the parts concerned,

but such was the inflammation and tumefaction of all the parts from the cubitus to the scapula, that it was impossible to decide whether or not there was a dislocation, although from all the concomitant circumstances its existence was rendered very probable. The ordinary remedies for the subduction of inflammation were immediately prescribed and assiduously persevered in for two weeks. When the inflammation and swelling had so far subsided as to admit of a satisfactory examination, the real cause of all the patient's sufferings was so obvious that no time was to be lost in attempting (what I considered extremely problematical) a reduction. The ordinary modes of reducing a dislocated humerus were immediately employed, but as the inflammation of the parts interested had not entirely subsided, the sensibility of the parts rendered a sufficient extension impracticable. The patient was remanded to his lodgings, and enjoined to persevere in the use of the antiphlogistic regimen and remedies, and desired to return at the expiration of a week. He returned agreeably to appointment, and my efforts were repeated, but with the same result. Such was the rigidity of the muscles and I presume the strength of the newly formed adhesions, that they seemed to oppose an insuperable impediment to our views. After availing myself of the powers of three men, and using all the usual means that art had devised, I found that I had gained nothing towards the completion of my object. In this situation I informed Mr. Collin that I knew of only one remedy that promised to aid us in the reduction, and by our joint persuasions we prevailed on the patient to submit to blood letting *ad deliquium animi*. A vein was immediately opened, but upon reflecting on the quantity of blood, that would probably be necessary to lose, he suddenly determined to abandon this proceeding and I was compelled to stop the blood, without having attempted a reduction of the bone. I now expressed a determination to relinquish my attentions, and proposed a consultation, with a view of impressing the necessity of immediately proceeding to the last resort, in so forlorn a case. Doctor Cocke was im-

mediately called in, and after hearing the preceeding history, concurred with me in opinion. The patient would not permit us to proceed to the operation, put procrastinated the time from day to day, till we lost nearly two weeks more, making in all, *seventeen weeks and three days* from the time he suffered the accident, till the day we adjusted the dislocated bone. Dr. Cocke and I had in this time repeated the ordinary means of reduction, and had remonstrated so strongly against the consequences that must attend him if the bone was permitted to remain in its then unnatural situation that he determined to surrender himself entirely to our discretion, and the next day was appointed for the attempt.

Our patient having seriously contemplated the gloomy prospect that presented itself, and finding that unless we succeeded he was probably destined to linger out the remnant of a miserable existence, in a hospital or poor-house, assumed a degree of resolution that enabled him to sustain the horrors of his situation with manly fortitude. Having already been so often baffled in my efforts in this case, and almost ready to despair of success, I surrendered the management of the patient to Dr. Cocke, and acted under his direction. Our apparatus was very simple. A strong towel was tightly rolled up, and formed into a ring sufficiently large to embrace the clavicle and scapula; the arm being passed through this ring, was fixed in such a situation that its upper part rested upon the middle of the clavicle while the under part laid near the inferior angle of the scapula; one corner of a sheet was attached to the forepart of the ring and the diagonal corner to the opposite point behind. Napkins were used in the usual way of making extension. Our apparatus being ready, we deemed it prudent to make one more effort before we opened a vein. Having placed three men on each side, they were desired to make the distention, which they did with great force, but with no other effect than an excruciating pain. The patient was now desired to stand erect, and a vein was immediately opened. The blood was permitted to flow till about three pounds had been drawn, when

he fainted and sunk on the seat behind him; this was the signal for the re-application of the extending forces. In the minute during which the syncope lasted, Dr. Cocke placed his foot against the seat on which the patient was seated, and his knee under the axilla to elevate and direct the dislocated bone. The doctor added his strength to the powers already in action and the bone was restored to its natural situation with a loud crepitus occasioned no doubt by the rupture of the adhesions lately formed. From the length of time that had elapsed since the dislocation, and the noise that was audible by every person in the room, the adhesions must have been very strong to have required so powerful a force to lacerate them. The head of the bone had become so well accommodated to its new situation, that previous to the reduction the patient could lift a considerable weight, and move his arm backwards and forwards without pain. The muscles of the dislocated arm were considerably diminished in size and their power much impaired. He experienced a difficulty in extending the thumb and index, and nearly a month elapsed before the vigor of the parts was completely restored. Five weeks after the reduction, he sailed for Liverpool, and had two weeks before done his duty as an able bodied man in lading the ship and making other preparations for the voyage.

We are the more solicitous to preserve this case, because an opinion is almost universally entertained, that there is no possibility of reducing a bone at so late a period after its dislocation. Indeed it has been inculcated by many respectable surgeons, that no attempt should be made after a certain period, not more than half the time after which we have found it practicable to succeed. I cannot find an instance in the annals of the surgical art, where success has attended the efforts of the most eminent practitioners after the bone had been misplaced, nine, or even eight weeks, and the most dexterous and enterprizing of the present day have concurred in the presumed impracticability of such an operation. It is probable we are yet to learn how much the world is in-

debted to our countryman, Dr. Physick, for this admirable improvement. From the combination of unfortunate circumstances attending this case, it may be fairly presumed, that a dislocation under different circumstances might exist for a much longer time, and still the adhesions not have been so firmly formed. The situation, habits, and the utter destitution of surgical assistance concurred in permitting the inflammation of the parts concerned to run the course of nature; and consequently to become more perfectly formed than they could have been had the proper remedies to arrest the progress of inflammation been used immediately after the accident. I indulge an expectation, that the fortunate issue of this case will encourage others not to consider every long protracted case of dislocation as beyond the reach of art, and that it will encourage them to endeavour to imitate our example.

NATHANIEL POTTER.

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WRIGHT,

On the Prussiate of Iron in Uterine Hemorrhage.

DEAR SIR,

AGREEABLY to promise I enclose for your consideration, some remarks on the use of the *Prussiate of Iron in Uterine Hemorrhage.*

In that action of the system which is the subject of this memoir, the theory of general disease which has fixed most firmly the attention of the medical world and established perhaps most permently the fame of its author, is, in my opinion exceedingly defective: I mean the hemorrhagie effort. No practitioner of medicine who has attended to a common epistaxis can admit the correctness of Dr. Brown's rejection of active hemorrhage. In offering a communication connected with this subject, I shall state facts with but few com-

ments, and prefer no apology. I do not intend to entangle myself nor perplex others with a long drawn chain of causes and effects. The apparent astringent effects of particular articles taken into the stomach, is a string that I have never seen touched with much harmonious vibration. It is one of those points upon which I think physiology has reflected but few of her luminous rays. My observations upon this subject are purely practical, as they were at first simply experimental. They may be found to be nugatory, but, as medicine as it now is, is the result of experiment upon a rude and indigested mass of discordant materials and no arrangement among them, I see no harm in offering another subject for the ordeal.

Sometime in the summer of 1809, I was invited to a consultation by a very respectable member of the faculty in a case of protracted uterine hemorrhage after parturition. The subject was a lady of a delicate constitution, though she generally enjoyed a tolerable share of health. She had been delivered about two weeks previous and the labour was natural. The lochia came on early in rather more than the usual quantity, but not so profusely as to be productive of immediate danger or alarm. Instead, however, of declining in quantity and consistence as is usual, in the course of a few days it had rather increased and preserved its florid complexion. Under those circumstances great and increasing debility necessarily demanded every effort of restraint that art could suggest. Those efforts had been made as far as the usual routine of practice would permit; for, as far as I could judge, the treatment both as to medicine and regimen had been judicious. All the ordinary means resorted to in such cases had been employed, and had failed. The patient's extremities were cold; the pulse frequent and very small, and the general prostration of strength so great as to prevent her from speaking above a whisper.

In conferring with much solicitude on the situation of the patient, and reviewing the various modes of treatment that had been adopted in this disease, the attending physician

mentioned to me a statement he had repeatedly received on this subject from an old lady in the neighbourhood, who had been forty years engaged in obstetric practice. She declared that it had been her practice, (and that it had been attended with the most flattering success,) to depend entirely in all such cases upon the administration of the substance known by the name of Prussian blue. As a woman, and not better informed than persons of her description generally are, she was incapable of making any distinctions in the states of her patients; but administered it as a specific, and she declared with almost uniform advantage. Her dose was half a teaspoonful in powder, repeated as she thought occasion seemed to require. The doctor informed me she was a woman of good character, and that he had heard from those whom she had attended, of many instances of her success by means of this remedy. Thus situated, with the case before us nearly hopeless, he intimated a desire to make trial of the medicine, and concluding that a doubtful remedy was better than none, I acquiesced.

I was under the necessity of leaving the patient immediately after the conversation, and did not see the doctor again for five or six months. The lady I understood had recovered, and when I next saw the doctor he informed me that he attributed her recovery to the use of the Prussiate, and mentioned the quantity she had taken, which I do not at this late period recollect. He informed me in addition, that he had subsequently treated several other cases of uterine hemorrhage in the same manner, and with invariable success.

This information from so respectable a source determined me to adopt with proper caution, the same course whenever I should meet with a case that baffled the usual remedies. Three cases only have since occurred to me, in which I found it necessary (or perhaps it would be better to say thought proper) to give the Prussiate of Iron. These were all within the last twelve months.

The first was a case in many respects similar to the one already detailed; except, that the discharge, at the time I

saw the patient (ten days after her delivery) was rather a thin bloody mucus amounting to nearly a pound in twenty-four hours; but attended by all the debilitating effects of a discharge of the same quantity of red blood. She complained of no pain. With the regimen usual in such cases she took ten grains of the Prussiate,* in milk, every third hour. This was continued till she had taken ninety grains, at which time the discharge was diminished to a very trifling degree, and the pulse previously very small became fuller. Bark and Gum Kino were administered after the cessation of the discharge, and completed the cure.

The second case, was that of a pregnant negro woman, who about two months before her expected time sustained a violent shock from a fall which happened in climbing a fence. Before any person could get to her to raise her from the ground, she discharged from the uterus at least two pounds of blood. I happened to be present when this accident occurred, and seeing the discharge ordered her to be carried into the house immediately. She was too heavy to be taken up by the force around her, and as there was no time to be lost, they dragged her into the kitchen. The blood marked her passage to the house (which was a few yards from the place where she fell) in a continued stream. As soon as she reached the house she fainted. Her clothes were cut off immediately, her head supported, her hips raised while she laid on her back on the floor. In this situation cold water was kept continually pouring on her abdomen for an hour or more, to which time the discharge had been gradually decreasing.

* The choice of the Prussiate of iron is a consideration of primary importance. The Prussian blue of the shops is designated by numbers 1, 2, 3, and is pure in the inverse ratio of the numbers. No. 1, is the only quality that can with propriety be admitted into the materia medica, and from this the dose should be graduated. The matters with which the Prussic acid and iron are combined, are argillaceous earth and whiting. As these substances cannot contain the virtues ascribed to the Prussiate, they are to be viewed as adulterating commixtures. EDITOR.

She was now raised upon some blankets that laid near her, and cloths wet with cold vinegar and water were constantly applied to the abdomen and labia. This accident occurred in the afternoon and the plan prescribed was pursued through the night. On the following morning the discharge continued in the quantity of about the second or third day's lochia, without pain, and was pure blood. I now directed ten grains of the Prussiate in milk, and ordered it to be repeated in three hours. She took six doses at this interval, by which time the discharge entirely ceased.

I apprehended that as the discharge should cease, and reaction succeed its debilitating effect, fever and pain would come on, and premature labour take place. Nothing, however, of this kind happened. Uterogestation was carried to its full time and the patient had a good labour. She lost in the whole six pounds of blood.

The last case in which I used the Prussiate, occurred in the present month, and the patient is still under my care in a convalescent state. This case is not calculated to furnish arguments in favour of, or against the use of the medicine. In this case twelve or fourteen days after delivery the discharge was free, very debilitating and attended with slight irregular pains. I gave the Prussiate three days without benefit; at the end of which time a piece of membrane and a considerable portion of the placenta were discharged, and the symptoms disappeared.

Your obedient servant,

THOMAS H. WRIGHT.

Elkridge Landing, August 20, 1811.

Hermbstaedt's Experiments to obtain Sugar.

From the London Medical and Physical Journal, vol. IV.

Chemical Experiments and Observations, on the Extraction of Sugar and Syrup from Indigenous Plants. *By* SIGISM. HENRY HERMBSTAEDT.

FROM the chemical analysis of vegetable substances, and the knowledge of their constituent and other particles contained and mixed with them, it is sufficiently evident, that the East and West Indies are not the only countries provided by nature with saccharine plants, but saccharine matter is abundantly found in other productions of the vegetable kingdom; and it only requires an assiduous examination to point out those vegetables, from which it may be most copiously, and in the least expensive way, obtained.

Among the plants hitherto examined, none deserves to be ranked so near the true sugar-cane, as the whole genus of maple trees; and, particularly, the sugar and silver maple, *Acer saccharinum, and A. dasycarpon ehrh.* Both trees have been used for these fifty years to obtain sugar from,* which in the last eight years has proved to be exceedingly profitable.† By my own experiments which I have repeatedly made since the winter of 1796, I found out, that from all species of maples, sugar may be with more or less profit obtained, and that the sugar and silver maple growing even in Germany, though not in the best soil, give a very good raw sugar, not inferior to the best West India cane-sugar, and which is got so cheap, that a pound of it will come no

* An account of a kind of sugar made of the juice of maple in Canada; Philosophical Transactions, No. 171. Klam, in the Transactions of the Royal Swedish Acadamy of Sciences, year 1751. Memoirs sur les fucre d'Erable usite dans le Canada, &c. Hist. 1757.

† Notices sur l'Erable a sucre des etats unis, et sur les moyens d'en extraire le sucre, &c. par M. Rush, in Rozier's Observations sur la Physique, &c. Tom. xli. Paris, 1792.

higher than eighteen or twenty plennige, or about two-pence halfpenny; and only a groshen or a penny, when instead of charcoal, common coal or turf are employed for boiling the juice, and particularly when the operation is made upon a large scale, as one labourer is able to attend five hundred trees during the period of tapping them. The process of boiling the juice is, besides, so very simple, that any person may soon learn it. But these advantages are only to be expected from the sugar and silver maple, as the other species, *Acer negundo*, *A. campestre*, *A. Platanoides*, and A. pseudoplatanus contain a less quantity of sugar which is also not so rich in saccharine matter. However, as plantations of those maples require a space of twenty or twenty-five years before the trees are large enough to admit tapping, it will not be improper, but of great utility to the community, to examine in the mean while those indigenous plants, from which likewise a useful substitute for the West India sugar may be extracted; and it is with this view I have made the following experiments.

1. *Experiments to obtain Sugar from India Corn.*

India corn, (zea mays) is said to contain, according to Vonsusti,* sugar, particularly in the nodes of the young stalks, from which Mr. Jacquin of Vienna,† has successfully prepared it; and this is farther confirmed by Mr. Marabelli‡ in a dissertation on the subject. It is likewise reported, that the extraction of sugar from the stalks of India corn, growing particularly in marshy soils, has been tried in Italy upon a large scale, but afterwards left off again, as it was found not to answer the purpose, the sugar thus obtained being more expensive than common raw sugar. To be convinced by my own experience on this subject, I made some experiments,

* Okonomische Schriften, i. e. Economical Writings, Tom. i. p. 307, and Tom. ii. p. 191.

† Crell's Chemical Annals, 1784, vol. I.

‡ Franc. Marabelli de Zea Mays planta, analytica disquisitio. Pavia, 1793.

of which the following are the results: A quantity of India corn was cultivated in a tolerable and somewhat marshy soil, for the purpose. When the young plants were about six inches high, the leaves, when chewed, had a sweetish taste, but the stalks, particularly about the nodes, tasted like sugar. These young plants being cut off as near the ground as possible, freed from the leaves, and sufficiently cleaned, ten pounds of them were cut in pieces, and being pounded in a stone mortar, the juice was expressed, which weighed three pounds. This juice, whose sweetish taste had still a disagreeable flavour of herbs, was clarified with the white of eggs, after which that taste was scarcely perceptible, and being thickened to the consistence of a syrup, eight ounces of a very agreeable tasting syrup were obtained.

2. *Examination of the Spikes of India Corn.*

As the young spikes, when they are beginning to form, possess a very agreeable saccharine taste, they were thought fit for being examined. Ten pounds of them were accordingly squeezed in a stone mortar, and the juice expressed after the leaves had been stripped off. These gave four pounds of a milky juice, which could not be rendered perfectly clear by the white of eggs. By a slow evaporation, to the consistence of a syrup, nine ounces of an agreeable tasting brown syrup were got, but which differed from the former by being more mucilaginous.

3. *Examination of Stalks of India Corn of a more advanced growth.*

Twenty pounds of these stalks were cut in pieces, and, with the addition of water, squeezed in a stone mortar and the juice expressed, which possessed a disagreeable and somewhat acrid taste. Being in the same manner clarified, and thickened to the consistence of a syrup, twelve ounces of syrup were obtained, which had a disagreeable saline taste, and might rather be considered as a vegetable extract than as sugar.

4. *Experiments for obtaining dry Sugar from India Corn.*

To learn whether it was possible to exhibit a crystallized sugar from this plant, the syrups prepared from the young stalks and the spikes were each dissolved by itself in fresh lime-water, and gently boiled by which a great part of their impurities was carried off. The liquors being strained through a woolen cloth, each of them was boiled to the thickness of a syrup, which was put in a glass, and set for eight months in a warm place, when little crystallizations of sugar appeared, which were with difficulty separated from the fluid. For this purpose, each syrup was evaporated by a gentle fire till it became dry, and this mass was digested with alkoholized spiritus vini to ebullition. The fluid, still hot, was instantly poured thro' some linen, whereon the mucilaginous parts remained; but on cooling the spiritous solution, a true sugar, of a yellow colour, crystallized in small grains. The alkohol being drawn from the remaining fluid by distillation, another portion of sugar was got by gentle evaporation, and altogether two ounces from the syrup of the young stalks, and one once and a half from that of the spikes.

By these experiments it is sufficiently shown, that from the young fresh stalks, as well as from the spikes of India corn, a true sugar can be extracted; but as its separation from the gummy and other particles mixed with it, is attended with such difficulties, and the gain so very inconsiderable, that a pound of raw sugar from this plant, would cost one rix dollar, or above three shillings, it appears that no profit or economy will arise from the fabrication of this sugar.

5. *Experiments for obtaining Sugar from the Siberia Cow-Parsnep.*

The Russian cow-parsnep, (*Heracleum sphondylium Linn. Heracleum Sibericum*) has been long known as a plant containing a great deal of saccharine matter, in which respect, according to Steller, (in his travels to Kamtschatka, in German) it deserves the next place to the sugar cane, and the

natives call it therefore *sweet-herb* or *katsh*. According to Gmelin (Flora Siberica, tom 1, p. 214) it does not differ from our common cow-parsnep; but others think it a particular species, to which they give the name of *sphondylium panaces*. The inhabitants of Kamtschatka gather the stalks of this plant in June, and having stripped off the leaves, they shave off the outer skin with muscle shells, and dry them in the sun, and afterwards they are chewed for the sake of sucking out the saccharine matter. In drying, the surface of the stalks is covered with white saccharine powder, which they separate by shaking them in a leather bag; but 40 lbs. of them afford only a quarter of a pound of this powder sugar, which therefore is considered as a great rarity. Besides this, the stalks and roots of the plants are employed for obtaining a sort of brandy.

I was supplied with some fresh plants of the Heracleum Sibericum for my experiments; but finding that the stalks were by no means so rich in sugar, as it is related of those plants growing in Siberia, I tried the roots, of which I got four pounds, the taste of which is sweetish like that of parsneps. Having freed them from the outer skin, they were dried, but no saccharine crust appeared on the surface; they were therefore ground, and being mixed with water, the juice was expressed, which tasted sweetish but a little acrid. Being boiled with the white of eggs, and clarified, it was thickened to the consistence of a syrup, of which six ounces were got, wherein, after a space of three months, a brown, grainy sugar had crystallized, which, however, was not quite free from a disagreeable flavour. Though it is shown by these experiments, that sugar may be obtained from that plant, yet the preparation of the sugar is too expensive for making use of it. It is, however, probable that the soil has a great influence upon the plant, and that therefore those growing in Siberia are richer in sugar.

6. *Experiments to obtain sugar from the Must of Wine.*

It might be presumed from the taste of must obtained from ripe grapes, that a considerable quantity of saccharine

matter is contained in it, though involved by mucilage. To try whether a true sugar could be extracted from it, some experiments were undertaken. Eight Berlin quarts of must, from ripe sweet grapes, were seethed with the white of eggs, clarified, and filtered. The fluid being evaporated, gave three pounds of an agreeable but acidulous syrup. To take away this free acid, the syrup was dissolved again in lime water, and so much of it added, till no acid was perceived by reagency. The fluid being again clarified and evaporated, a very agreeable syrup was obtained, but from which it was by no means possible to procure crystallized sugar. However, this syrup would not be very profitable at the high price of must.

7. *Experiments with the Juice of the white and black Birch, for the sake of obtaining sugar.*

It has been much doubted, whether sugar might be got from the juice of those trees. Mr. Stæhlhammer, (Transactions of the Swedish Academy, vol. xxxv.) prepared from the juice of the white birch, *Betula alba*, tapped in the spring, a considerable quantity of syrup, superior to the common brown syrup, but not so good as that from the maple. Mr. Kalm (*Ibid.* vol. xiii.) relates, that from the North American black birch (*Betula nigra, carpinifolia*,) also called sugar birch, a great deal of sugar is obtained, which is not so sweet as that from the maple. Having received a sufficient quantity of the juice of both trees, I found that from one hundred and fifty Berlin quarts of the juice, extracted in April from fifty trees of the white birch, two pounds and a half of brown syrup were obtained, out of which no crystallized sugar could be got. But fifty quarts of the juice of the black birch gave one pound and a half of a very good and useful syrup, yet inferior to that of the maple. From this syrup a considerable portion of crystallized sugar separated; by which it appears, that sugar may be obtained from the black birch, but

much inferior in quality to that of the maple, and at the same time, more expensive.

8. *Experiments to obtain Sugar from the Beet. (Beta cicla alba.)*

It is more than fifty years since the late Mr. Marggraff made several experiments with different species of the beet, to try how far it was possible to obtain a useful sugar and syrup from them; in which, however, he seems to have particularly succeeded with *Beta cicla*, as he extracted from two pounds of its fresh roots, half an once of good sugar. Induced by these experiments, I took sixty-eight pounds of the roots of beet, which being sufficiently cleaned, were ground and squeezed, and the residuum being moistened with warm water and again expressed, about twenty quarts of juice were obtained. A third part of this having evaporated, it was then mixed with twenty quarts of lime-water, and boiled for half an hour. The juice thus became clear, and of a yellowish colour, was filtered and afterwards thickened to the consistence of a syrup, of which six pounds were obtained in this way, of a brown yellowish colour, and an agreeable taste. A part of it was poured into an evaporating glass dish, in which some glass tubes had been placed; and being exposed for sixteen weeks in a warm situation, those tubes were found to be incrusted with crystals of sugar about the size of a pea, and very much like brown sugar-candy. A bushel of the beet roots costs about half a crown, and the expense of obtaining a syrup from them is not much above six-pence; a pound of the beet syrup would, therefore, come no higher than about four-pence, which is less than the price of the common syrup in Germany; consequently, it might prove a very advantageous substitute. The sugar may likewise be obtained cheap enough, in comparison to the present high price of the cane-sugar; but the operation to extract it is very long and slow; and though it equals the sugar of the maple in goodness, yet the process of extracting it is far more expensive.

9. *Experiments to obtain Sugar from another Species of Beet, (Beta vulgaris altissima, or Beta eicla altissima Jacquin. Bunkelrube, Germ.)*

This species of beet-root is commonly cultivated in some parts of Germany, as a very good food for cattle, and differs from the former by being more succulent and of a sweeter taste. The roots grow larger, and contain more juice, when cultivated in a rich soil. A bushel of these roots, which weighed about twelve pounds after the outer rind had been taken off, were ground upon a grater; and after a part of the juice had discharged itself during the grinding, the rest was expressed; by which means, twenty-four quarts of a very sweet violet-coloured juice were obtained. Taught by repeated experiments, I first boiled it to the evaporation of one third, by which a great deal of albuminous matter separated. When cool, it was poured through a woollen cloth mixed with twenty-four quarts of lime-water, and boiled for half an hour. The juice became in this way a clear fluid of a yellowish colour, being freed from a great part of its impurities. After having cooled and strained it, it was boiled to the thickness of a syrup, of which eight pounds were got. A part of this was likewise exposed in a deep evaporating dish, in which glass tubes were put, to a gentle evaporation, and after two months a deep yellow sugar was found to have crystallized on those tubes. As the crystallization of sugar proceeds very slowly in this syrup, as well as in the former, the quantity of sugar which it may contain, cannot be determined; but as this syrup is by far more agreeable than common syrup, and moreover, as including all expenses, a pound will cost no more than about three half-pence, it may likewise serve as a useful substitute. This species of beet is the same which Mr. Archard, of Berlin, has since used for the fabrication of sugar upon a larger scale.

10. *Experiments for obtaining Sugar from the Red Beet, (Betarubra, Beta eicla rubra, Jacquin.)*

The possibility of obtaining sugar from the common red beet has been already shown by Marggraff; I proceeded

therefore in the same way as with the former, and obtained from a bushel of its roots six pounds and a half of syrup, which had rather an unpleasant rough taste, from which, however, it may perhaps be freed. I did not try to get sugar from it, though Marggraff obtained from eight ounces of dried roots, two and a half drachms of sugar.

(To be continued.)

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From the Eclectic Repertory.

Inguinal Aneurism cured by tying the External Iliac Artery, in the Pelvis.

BY JOHN SYNG DORSEY, M. D.

ON the 15th of August, 1811, I was consulted by Alexander Patton, on account of a tumor in his right groin. The patient was a native of Aberdeenshire in Scotland, aged about thirty years, the last ten of which he had passed in America, having followed the trade of a cooper; was accustomed to hard labour, and to athletic exercise, jumping, running and the like. He was six feet in height, of a robust but not a corpulent habit.

Two years ago he perceived, for the first time, a small tumor in the right groin. Having never had the venereal, nor indeed any other disease, and not having met with any accident, he was at a loss to account for this appearance. From its commencement it throbbed with considerable violence. For a year and four months it encreased very slowly; during the last eight months much more rapidly. In January it was no bigger than a walnut; in August its shortest diameter was four inches, its longest, nearly five. It occasionally gave him severe pain, and at length incapacitated him from all labour. In June last he applied to Dr. Irwin, of Easton, the place of his residence, who instantly apprised him of the nature and importance of the complaint, and advised him to come to Philadelphia. He arrived here the 14th of August, and was admitted next day into the Pennsylvania hospital.

On examination, an aneurism was found, situated immediately below Poupart's ligament, forming a regular tumor in the groin, nearly hemispherical, with a kind of apex, where the skin appeared extremely thin, and discoloured as if by ecchymosis. The patient had used a good deal of exercise previously to his admission into the hospital, and had taken a drink of rum, in consequence of which his arterial system was greatly excited, and the tumor pulsated so violently that the bed clothes were bounced up with great force. He was confined to bed; was purged, and kept to a low diet. A consultation was called; and the surgeons of the house concurred in recommending the operation of tying the artery as high as practicable above the tumor. It was determined to perform the operation promptly; as the disease was progressing, and no benefit was to be expected from delay.

On Monday, 19th of August, at noon, in presence of Dr. Physick and Dr. Hartshorn, surgeons to the hospital, and a number of medical gentlemen, I proceeded to the operation. The patient, having previously taken fifty drops of laudanum, was placed on the table. An incision, three inches and a half long, was made, beginning an inch and a half higher than the superior anterior spinous process of the ilium, and one inch distant from that process internally; being also four inches and a half distant from the umbilicus, extending obliquely downward, and terminating about one inch above the basis of the tumor. This incision, which was nearly in the direction of the fibres of the tendon of the external oblique muscle, divided the skin and adipose membrane, and exposed that tendon, which was next cut through, the whole length of the external incision. The internal oblique muscle now protruded at the wound and was carefully cut through; the inferior edge of the transversalis abdominis was next divided, but not so far upward as the top of the external wound. My finger was then introduced, and the cellular texture readily yielded it a passage to the external iliac artery, the trunk of which I distinctly felt pulsating very strongly. With my finger I separated it gently from

the neighbouring parts; but took care to denude only a very small portion of the vessel. The peritoneum I was equally careful to detach as little as possible; and not more than a square inch of it was disturbed. The only remaining difficulty in the operation was to pass the ligature round the vessel; and this having been anticipated, was readily surmounted. Before commencing the operation, I had secured an aneurismal needle (a blunt bodkin of silver properly bent) in a pair of curved forceps, by tying the handles of the forceps firmly together. The needle was armed with strong bobbin; and thus connected with the forceps, resembled a tenaculum, which could easily be managed outside of the wound. With one finger in the wound I found it very easy to direct the extremity of the needle, and with the forceps in my other hand, to push it through the fascia surrounding the vessel. The string connecting the handles of the forceps was now cut, and the needle was left under the vessel. The forceps being removed, the needle was drawn out, leaving the ligature round the artery. Convinced, by careful examination, that nothing but the artery was included in the ligature, and that it was, to the best of my judgment, natural in size and texture, I tied it very firmly, as high up as possible. The pulsation of the tumor instantly ceased. Three knots were made, and the ends of the ligature were left out at the external wound. No blood vessel of magnitude was divided, and not half an ounce of blood was lost. No stitches were employed to close the wound; a strip of adhesive plaster effectually answered this purpose. A pledget of lint was applied, and the patient was put to bed, his thigh being moderately flexed upon the pelvis. He complained of extreme pain during the latter part of the operation, the whole of which occupied eleven minutes.

The patient's pulse, for several days before the operation, was 80: after the operation it was 88, and rose in the afternoon to 100. At four o'clock he was bled ten ounces. At seven he complained of extreme pain in the back and belly, and also of some pain in the limb. He was not permitted

to take any sustenance except toast and water. The superficial veins of the leg and foot were filled; and the whole of the limb was covered all the evening with perspiration. Its temperature was examined repeatedly by a thermometer, and was five degrees colder than the other. It was covered with flannel and carded wool.

Tuesday 20th. Passed a restless night, in great pain. To use his own language, in expressing his sensations, "he felt as if his loins were tearing apart." He was also troubled with pain of the bowels. Three grains of calomel and ten of rhubarb were given, but without procuring a stool. In the afternoon he was bled ten ounces, and a purgative injection was ordered; after which his bowels were freely opened, and his pain subsided. An enema, consisting of a hundred drops of laudanum and two ounces of water, was administered, and he soon after fell asleep. The weather, on the day of operation and several days after, was very hot. The mercury of the thermometer in the patient's room stood at 86° Fahrenheit. Placed between the toes of the aneurismal limb, it rose to 88°; between those of the sound limb 90°, at both knees it stood at 92°. His pulse was 100, and tense.

Wednesday 21st, *third day* after the operation. The sleep procured by the anodyne injection continued all night. In the fore part of the day he was easy: but in the evening his pain returned with considerable fever. He was bled ten ounces and took ten grains of magnesia and as much rhubarb: this with the assistance of a clyster, brought away a large quantity of feces and flatus, and procured relief of all his pain. The anodyne injection was again administered, and he soon after slept. His pulse 100 and somewhat tense.

Thursday, *fourth day*. He slept all night and was much better; being quite free from pain and fever. His pulse 90. He eat some boiled rice with great relish. The wound was examined and it was found that nearly all of it had united: a little healthy pus surrounded the ligature. The limb was four degrees colder than the sound one.

From this time no change of importance occurred until Sunday, 1st Sept. when the ligature came away; viz. on the fourteenth day after the operation. In a few days more the wound cicatrized, without the occurrence of a single unpleasant symptom. On the twentieth day after the operation, his nurse being absent, he arose from the bed and walked across the room, and has taken exercise every day since without inconvenience. The tumor in the groin diminishes slowly, and at this time is very much reduced in size.

Remarks. The operation of tying up the external iliac artery above Pourpart's ligament was first performed by Mr. Abernethy, under circumstances in which immediate death was the only alternative. He repeated it afterwards in cases of aneurism seated so high in the femoral artery as to preclude all prospect of a cure by any other means. He performed the operation four times. In the first two instances his patients died; in the succeeding cases they recovered* Mr. Freer, in the Birmingham hospital, performed the operation in a case of inguinal aneurism with complete success; and soon after another case was treated successfully by Mr. Tomlinson, in the same hospital.† These six cases are all I have seen related, in which the operation has been tried. The case I have now detailed is the seventh; and it has failed in only two of these. In every instance the limb has been supplied with blood, which does not uniformly happen after the operation for popliteal aneurism.

I wish, before closing this paper to call the attention of those surgeons, who may have occasion to perform the operation, to the forceps, an engraving of which is annexed‡. This instrument was contrived several years ago by Dr. Physick for the purpose of passing a needle under the pudic artery, when wounded in lithotomy, and has since been used by him for securing bleeding arteries in deep narrow wounds. Mr. Abernethy complains of "the great difficulty of turning a common needle in a deep narrow wound;" and Mr. Freer

* Abernethy's Surgical Observation.
† Freer on Aneurism.
‡To the original paper in the Electric Repertory.

was unable to pass his aneurismal needle round the iliac artery, until he punctured the fascia surrounding it with his knife, which he confessed was the most "difficult and dangerous part of the operation." These dangers and difficulties are entirely obviated by means of the curved forceps; and I think the operation greatly simplified by the use of this contrivance.

Should this paper meet the eyes of Mr. Abernethy, I hope he will be gratified with the additional testimony of the importance of an operation for which the world is indebted to the intrepid efforts of true genius; and he will no doubt learn with pleasure, that one individual on this side the Atlantic owes to it, his life.

Arch Street, 20th September, 1811.

AN ACT

To establish and incorporate a Medical and Chirurgical Faculty or Society, in the State of Maryland—passed 1798.

WHEREAS it appears to the General Assembly of Maryland, that the establishment and incorporation of a Medical and Chirurgical Faculty or Society of Physicians and Surgeons, in the said state, will be attended with the most beneficial and salutary consequences, by promoting and disseminating medical and chirurgical knowledge throughout the state, and may in future prevent the citizens thereof from risking their lives in the hands of ignorant practitioners or pretenders to the healing art—Therefore,

II. *Be it enacted by the General Assembly of Myryland*, That Gustavus Brown, William Lansdale, Barton Tabbs, Elijah Jackson and William H. Roach, of St. Mary's county; James M. Anderson, junr. Morgan Brown, junr. Edward Scott, Robert Geddes and Edward Worrel, of Kent county; Charles Alexander Warfield, Richard Hopkins, Wilson Waters, Thomas Noble Stocket and William Murray, of Ann-Arundel county; Thomas Bourne, Thomas Parran, Joseph Ireland, Daniel Rawlings and James Gray, of Calvert county; John Parnham, Gustavus Richard Brown, Daniel Jenifer and Gerhard Wood, of Charles county; Thomas Cradock, Thomas Love, John Cromwell, Philip Trapnel and Christopher Todd, of Baltimore county; Perry E. Noel, Stephen Theodore Johnson, Tristram Thomas and Ennalls Martin, of Talbot county; Levin Irvin, Arnold Elsey, Ezekiel Haynie, John Woolford and Mathias Jones, of Somerset county; Edward White, James Sullivane, Dorsey Wyvill, William Hays and Howes Goldsborough, of Dorchester county; Abraham Mitchell, William Miller, Elisha Harrison, John Groome and John King, of Cæcil county; Richard I. Duckett, William Beans, junr. William Marshall, William Baker and Kobert Pottenger, of Prince

George's county; Upton Scott, James Murray, John Thomas Shaaff and Riverdy Gheselin, of the city of Annapolis; James Davidson, John Wells, Samuel Thompson, Robert Goldsborough and John Thomas, of Queen Anne's county; John Neille, Thomas Fossett, George Washington Purnell, John Purnel and John Huston, of Worchester county, Philip Thomas, Francis Brown Sappington, William Hyllary, John Tyler and Joseph Sim Smith, of Frederick county; John Archer, Thomas H. Birckhead, Elijah Davis and Thomas Archer, of Harford county; Jesse Downes, John Young, junr. William B. Keene, Joseph Price and Henry Helm, of Caroline county; George Buchanan, Lyde Goodwin, Ashton Alexander, Arthur Pue, Daniel Moores and Henry Stevenson, of the city of Baltimore; Richard Pindell, Samuel Young, Peter Waltz, Jacob Schnively and Zachariah Claggett, of Washington county; Edward Gantt, Charles Worthington, Joseph Hall, Zadock Magruder, junr. James Anderson and Charles A. Beatty, of Montgomery county; Benjamin Murrow, James Forbes and George Lynn, of Allegany county, and such persons as they may from time to time elect, and their successors, are hereby declared to be one community, corporation and body politic, forever, by and under the name and title of the *Medical and Chirurgical Faculty* of the state of Maryland, and by and under the same name and title they shall be able and capable in law to purchase, take, have and enjoy to them and their successors, in fee, or for lease estate or estates, any lands, tenements, rents, annuities, chattels, bank stock, registered debts, or other public securities within this state, by the gift, bargain, sale or devise of any person or persons, bodies politic or corporate capable to make the same, and the same at their pleasure to alien, sell, transfer or lease, and apply to such purposes as they may adjudge most conducive to the promoting and disseminating medical and surgical knowledge, or to alleviating the calamities and miseries of their fellow-citizens: Provided, nevertheless, that the said faculty or body politic shall not, at any one time, hold or possess

property, real, personal or mixed, exceeding in total value the sum of ten thousand dollars per annum.

III. *And be it enacted*, That the members of the said faculty above designated, may and shall hold their first meeting, at the city of Annapolis, on the first Monday in June next or as soon thereafter as a number, not less than fifteen of them, can be convened; at which meeting they may appoint a president, a secretary and treasurer, make a common seal, and may elect into their body such medical and chirurgical practitioners within this state, as they may deem qualified to become members of the faculty.

IV. *And be it enacted*, That it shall and may be lawful for the said medical faculty, or any number of them then attending, (not less than fifteen) to elect by ballot twelve persons of the greatest chirurgical abilities in the state, who shall be styled the *Medical Board of Examiners* for the state of Maryland, seven of whom shall be residents of the Western and five of the Eastern Shore of Maryland, whose duty it shall be to grant licenses to such medical and chirurgical gentlemen as they, either upon a full examination, or upon the production of diplomas from some respectable college, may judge adequate to commence the practice of the medical and chirurgical arts, each person so obtaining a certificate to pay a sum not exceeding ten dollars, to be fixed on or ascertained by the faculty.

V. *And be it enacted*, That any five of the examiners appointed for the Western, and any three of those appointed for the Eastern Shore, shall constitute a board on their respective shores for examining such candidates as may apply on the said shores respectively, and shall subscribe their names to each certificate by them granted, which certificate shall be also countersigned by the president of the faculty, and have the seal of the faculty affixed thereto by the secretary upon the payment into the hands of the treasurer, the sum of money to be ascertained as above, by the faculty; and any one of the said examiners may grant a license to practice until a board, in conformity of this act, can be held.

VI. *And be it enacted*, That after the appointment of the aforesaid Medical Board, no person, not already a practitioner of medicine or surgery, shall be allowed to practice in either of the said branches and receive payment for his services, without first having obtained a license, certified as by this law directed, under the penalty of fifty dollars for each offence, to be recovered in the county court where he may reside, by bill of presentment and indictment, one half for the use of the faculty, and the other for that of the informer.

VII. *And be it enacted*, That every person, who upon application, shall be elected a member of the Medical Faculty, shall pay a sum not exceeding ten dollars, to be ascertained by the faculty.

VIII. *And be it enacted*, That the Medical Faculty be and they are hereby empowered, from time to time, to make such bye-laws, rules and regulations, as they may find requisite, to break or alter their common seal, to fix the times and places for their general meetings, for the meetings of the Board of Examiners, the modes and times of electing officers, filling up vacancies in the Medical Board, and to do and perform such other things as may be requisite for carrying this act into execution, and which may not be repugnant to the constitution and laws of this State or the United States.

Supplement, passed 1801.

No person who is not already a practitioner of medicine or surgery, within this state, shall be allowed to practice in either of the said branches, and recieve payment for the same, without having first obtained a license agreeably to the original act to which this is a supplement, under the penalty of fifty dollars for each offence, to be recovered in the county court where the offence is committed, by presentment and bill of indictment ; one half for the use of the faculty, and the other for the informer.

Nothing herein contained shall extend, or be construed to extend to prohibit any person, during his actual residence

in any other of the United States, and who by the laws of the state where he doth or may reside, is not prohibited from practising in either of the above branches, from practising in this state, within fifteen miles from the residence of such practitioner: Provided always, that it shall and may be lawful for any person resident as aforesaid, and not prohibited as aforesaid, when specially sent for to come into any part of this state, and administer or prescribe medicine, or perform any kind of surgical operation for the relief of such to whose assistance he may be sent for.